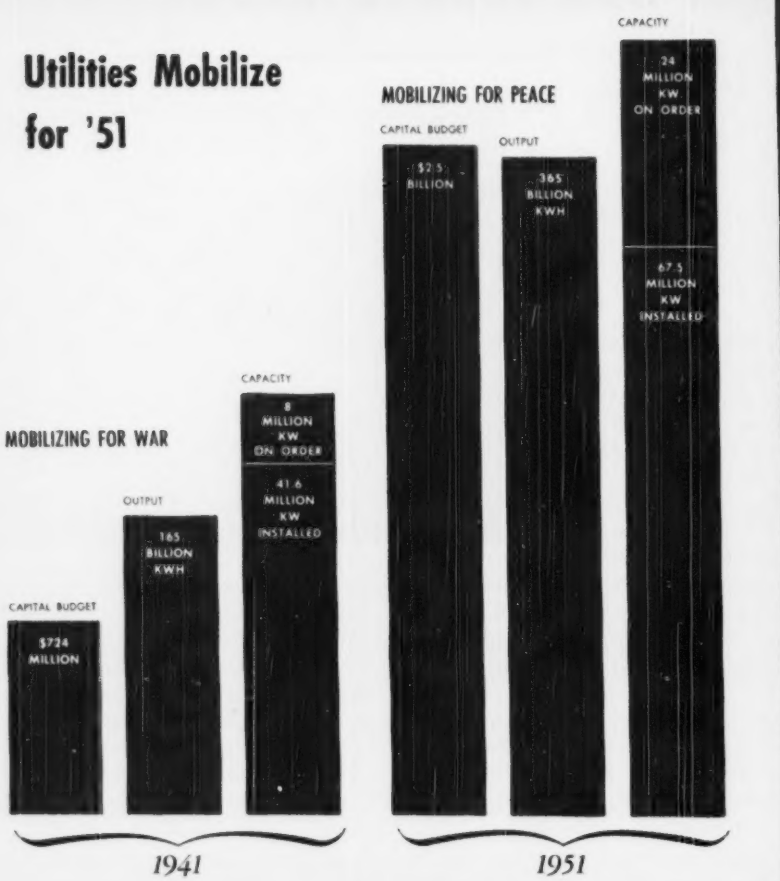
ELECTRICAL WORLD

A McGRAW-HILL PUBLICATION

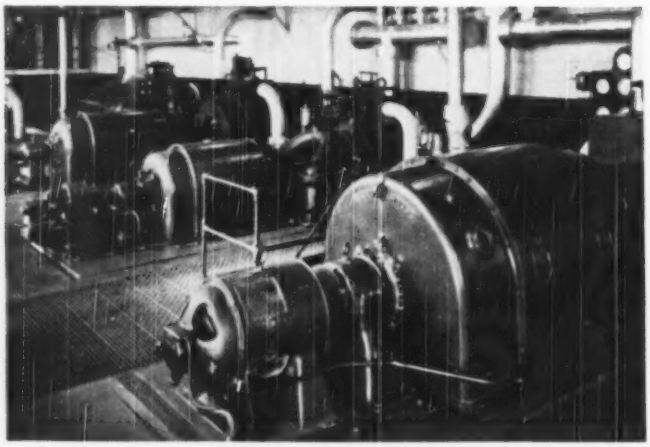
SEPTEMBER 11, 1950 • OUR 76th YEAR



Electrical World's Forecast for 1951

Plain talk about ADDITIVES...

and the better turbine oil performance you get with TEXACO REGAL OILS (R&O)



You can't make a silk purse out of a sow's ear, nor a good turbine oil out of a poor one by the use of additives. Additives may "soup up" a poor oil temporarily, but the effect soon wears off.

Texaco Regal Oils were outstanding turbine lubricants for many years before rust- and oxidation-inhibiting additives came into use. *With* these additives, *Texaco Regal Oils (R & O)* are even better. Their resistance to oxidation is some 20 times greater, their ability to give long-lasting protection against rust is vastly increased.

In addition, *Texaco Regal Oils (R & O)* are specially processed to increase their basically excellent anti-foaming properties. All this adds up to a greater margin of safety for turbines . . . greater assurance of clean lubricating systems, full bearing protection, instant governor response . . . throughout an extra-long oil service life.

A Texaco Lubrication Engineer will gladly explain in detail the specific benefits *you* can expect from the use of *Texaco Regal Oils (R & O)*. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Regal Oils (R&O)

FOR ALL TURBINES

NOTES ON GARBAGE & ECONOMICS

The town of Jasper, Indiana, has 6,000 people and a hustling young mayor named Herbert E. Thyen (above). Jasper does **not** have any garbage cans—or garbage trucks.

But Jasper has a new garbage disposal plant and (at this writing) 70% of its homes have electric garbage disposers, with that figure growing daily. How Hizzoner Mayor Thyen sold the idea and how it saves $6,000 a year is quite a story. Is there a great load-building idea here? **E. W.** for Sept 25 will give you the full details.

G. E. Schmitt is assistant general manager and chief engineer of the Lower Colorado River Authority, which has one of the very few installations in the world for pumping storage water to obtain peak capacity.

The economics of pumped storage is highly interesting: Except for losses it takes as much energy to pump the water **up** as the water can create coming **down**. How it all works out is interestingly told by Engineer Schmitt in **Electrical World** for Sept. 25.

THE EDITORS

ELECTRICAL WORLD

Published for 76 years for those engaged in the business of generating, transmitting, distributing or applying electric power

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an electrical cable is no better than its

An electrical cable is only as efficient and long-lasting as its insulation. You will find true cable economy *only* in the cable with the best insulation. Because electrical insulation is so vital to cable performance, it is important to know what makes one type of insulation better than another.

There are three basic factors determining the electrical and mechanical characteristics of rubber cable insulation.
1. The type and grade of rubber used in the compound.
2. The method of applying the insulation to the cable.
3. The method of vulcanizing the insulation.

In Okonite insulations, each of these three points is a reason for superior performance. First, Okonite uses only Wild Up-River Fine Para rubber – the very finest obtainable – because this rubber has proved during more than 70 years of actual use to have better dielectric and aging qualities than any other.

Second – the unique Okonite strip method of applying insulation assures absolute uniformity of wall thickness . . . perfectly centered conductors. This advantage, guaranteed only by the strip method, is another reason for the famous long life and dependability of Okonite-insulated cables.

Third – after the insulation has been applied by the strip method, it receives a *single* vulcanization in a continuous tin mold, under high pressure. Advantages of this exclusive process are an insulation of higher density, greater physical and electrical uniformity.

Years of operation under widely varied conditions – the most convincing test of all – *prove* the longer life and more dependable performance you obtain from an Okonite insulation. The Okonite Company, Passaic, N. J.

8107

THE BEST CABLE IS YOUR BEST POLICY

OKONITE SINCE 1878 ***insulated wires and cables***

ANCHORAGE for the NEUTRAL SUPPORTED SYSTEM OF SERVICE DROPS . . .

Electroline Automatic Dead End

The 3800 Series Service-Drop Automatic Dead End, for holding pre-assembled service cable that uses a bare neutral conductor as the messenger. This service-drop dead end is assembled as a one-piece unit, with no loose parts to be dropped or lost. It has one end of the flexible bail detachable for installation around a spool type insulator or other supporting anchorage—permitting quick and easy installation. Only one part, other than the conductor, is handled by the lineman. This Electroline Automatic Service-Drop Dead End can be reclaimed and used again. But, once it is installed, it cannot become detached until conductor is removed by the lineman. The practice of gripping the bare neutral employed by the Electroline method of dead ending eliminates the danger of destroying the insulation and short circuiting phase wires.

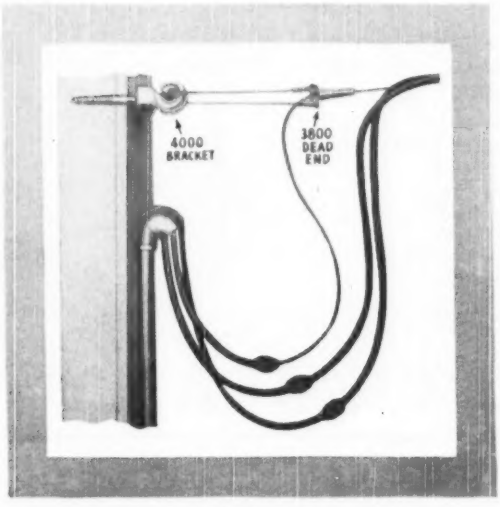
Electroline Anchor Bracket

The 4000 Series Service-Drop Anchor Bracket securely supports the cable at any angle. It is so designed that a closed bail or loop can be easily inserted without opening the loop. This one-piece, light weight unit reduces installation costs and no previous experience is necessary to install it.

The 4000 Bracket eliminates the insulator and insulator hardware at the building.

Two types are available: one with a $\frac{1}{2}$" diameter galvanized lag screw in lengths from 3" to 5" inclusive. The other type contains a $\frac{1}{2}$-13 galvanized nut for use in installations where a threaded end of bolt extends through wall of building.

The Electroline 4000 Series Anchor Bracket is made of aluminum and a galvanized steel lag screw, or nut to withstand corrosion and the discoloration of outside building walls . . . it is vibration-proof and fool-proof.



Both the Electroline Service-Drop Automatic Dead End and Anchor Bracket are designed to harmonize with residential and commercial buildings.

Write for new bulletins for complete details.

Electroline Company

4121 South La Salle Street Chicago 9, Illinois

IN CANADA
POWERLITE DEVICES, LTD., TORONTO

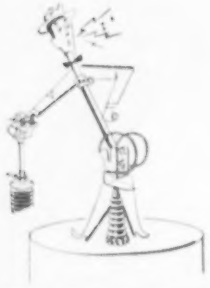
NOW MOUNT DropOut POWER FUSES

AND SAVE MONEY ON INSTALLATION

VERTICAL

UPRIGHT

INVERTED



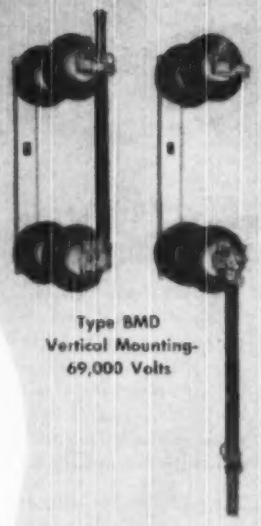
ON A TRANSFORMER

Your structures and bus work no longer need be twisted to accommodate a vertical mounting when a high voltage drop-out power fuse is called for.

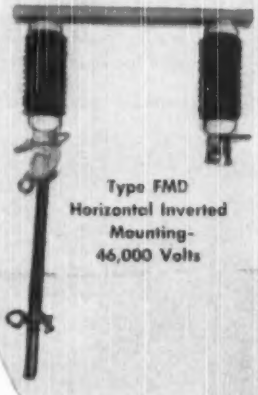
As revealed by these photographs, SMD-2 Drop-out Power Fuses drop *up*, drop *open*, or drop *down* for isolation, and to give indication of fuse operation. In each voltage rating from 34,500 to 138,000, there is a vertical, an upright, or an inverted mounting. Also, in ratings up to 69,000 volts, the SMD-2 can mount on your transformer bushing without introducing any hazard to the bushing from recoil or "drop-up".

Such a variety of mountings saves you money because it: (1) simplifies the design of new installations; (2) often permits the use of existing structures without modification; and (3) yields a great variety of methods for changing fuses safely and swiftly.

Mounting versatility is just one of the benefits designed into SMD-2 Power Fuses, making them easy for you to apply — and so gain the advantages of FULL COVERAGE* fuse protection.



Type BMD
Vertical Mounting-
69,000 Volts



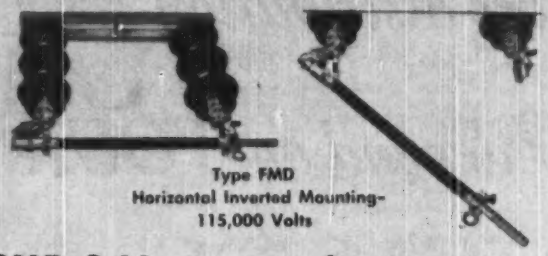
Type FMD
Horizontal Inverted
Mounting-
46,000 Volts

For the full story
see your S&C representative,
or ask for new
Catalog Section 262.

S&C ELECTRIC COMPANY

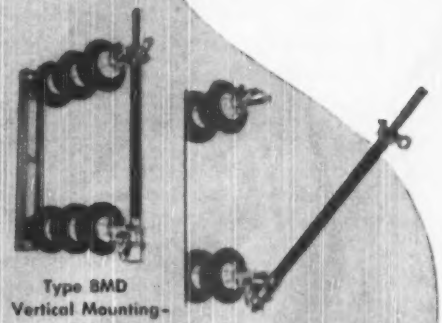
Formerly SCHWEITZER & CONRAD, INC.

TO FIT YOUR JOB

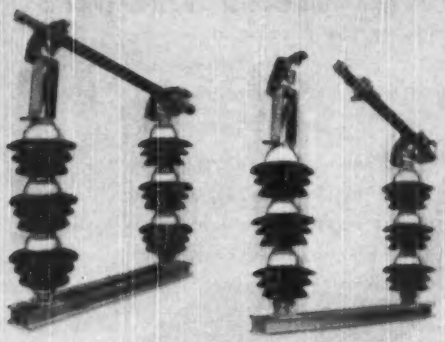


Type FMD
Horizontal Inverted Mounting–
115,000 Volts

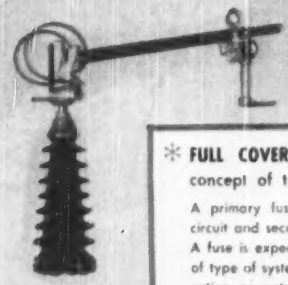
SMD-2 VERSATILITY ILLUSTRATED



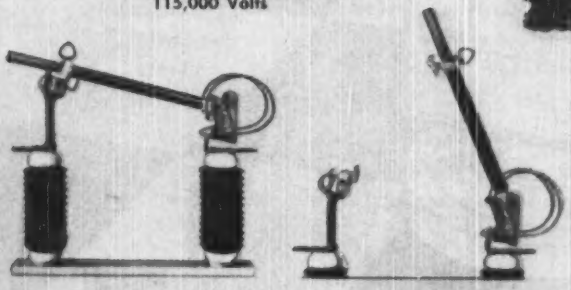
Type BMD
Vertical Mounting–
115,000 Volts



Type EMD
Horizontal Upright Mounting–
115,000 Volts



Transformer
Bushing Mounted
SMD-2 Power Fuse–
69,000 Volts



Type EMD Horizontal Upright Mounting–
46,000 Volts

✳ **FULL COVERAGE PROTECTION IS:** the new concept of transformer fusing in which:

A primary fuse is applied for both primary short circuit and secondary back-up short circuit protection. A fuse is expected to perform dependably regardless of type of system; type of fault current; type of application; or system and atmospheric conditions.

✳ **FULL COVERAGE PROTECTION PROVIDES** — along with the above protection — savings in operating expense by:

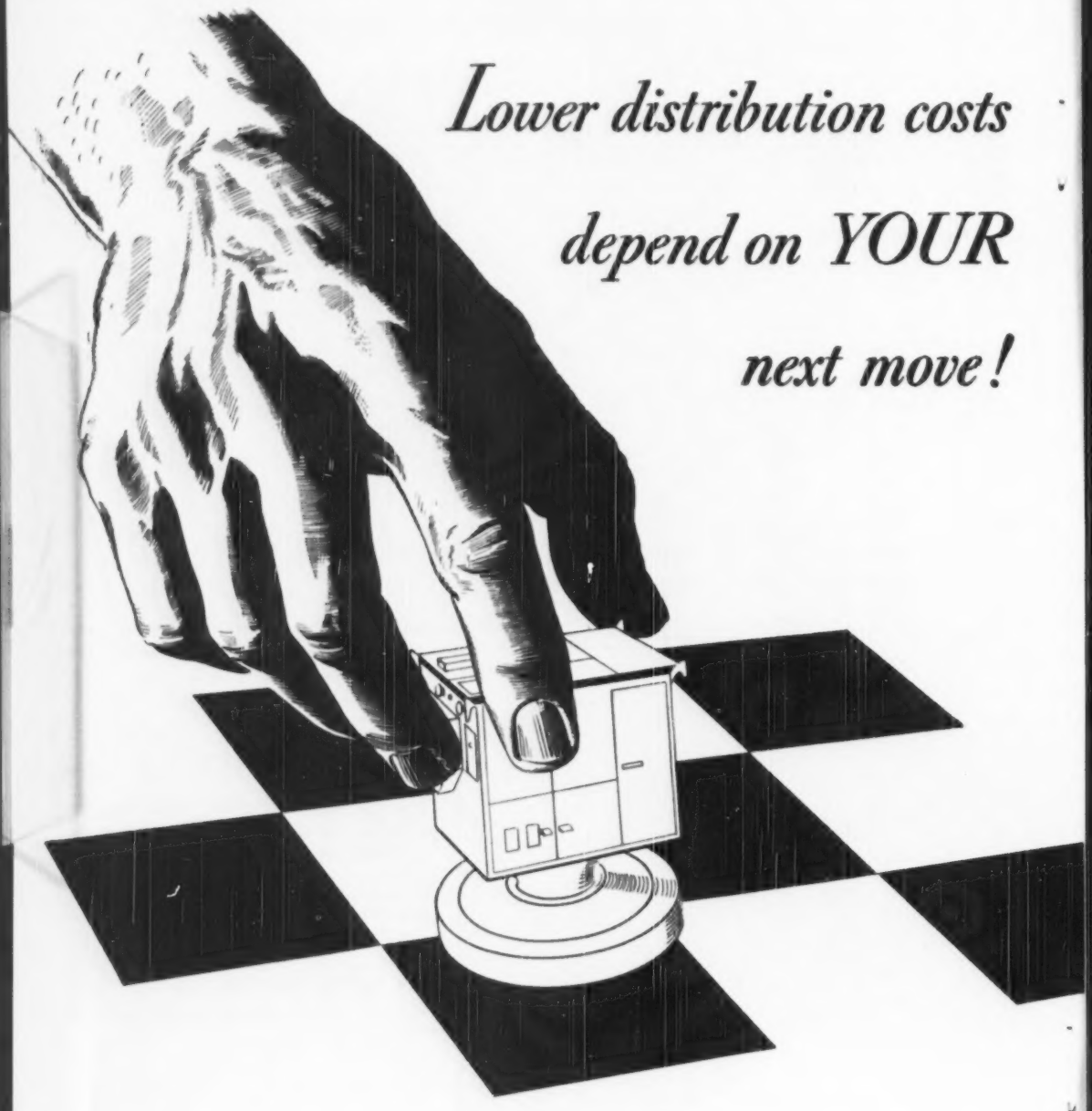
Eliminating the need for replacement of "suspect" fuses on other phases when one fuse blows.
Eliminating the need for periodic replacement of fuses to prevent "sneak-outs" caused by vibration- or age-weakened fusible elements.

✳ **FULL COVERAGE PROTECTION REQUIRES:**

dependable high and low fault-current interrupting ability;
protection against dielectric breakdown or external flashover from severe recovery voltage;
a fine degree of accuracy in time-current characteristics;
a "non-damageable" fusible element which cannot be injured by surge currents, vibration, or aging;
a choice of time-current characteristics to provide flexibility in coordinating with other primary, and with the secondary, protective devices.

4421 Ravenswood Avenue
Chicago 40, Illinois, U. S. A.

In Canada, Powerlite Devices, Limited, Toronto


Lower distribution costs
depend on YOUR
next move!

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

. . . and there is only one way to make it count! *Have a modern system planned before you expand or make replacements to your present system.*

Loads may quadruple in the next 25 years. This means your present system will be virtually replaced within that period. So when you plan ahead . . . seek system and equipment characteristics that will enable you to cope with expanding loads *economically!*

There are several logical objectives at which you may aim:

A simplified system: Today's trend toward simple loop or radial subtransmission patterns seems certain to effect sharp cuts in distribution costs. Complex interconnections are eliminated. The cost of equipment at numerous system tie points is saved. And the inherent simplicity of these systems promises substantially lower operating and maintenance costs. What's more, the simplified system permits employment of a second important, cost-saving tool:

Standardized, factory-assembled substations . . . which utilize less equipment . . . provide for less costly bus regulation, and allow for shorter distribution feeders because you can bring high voltage closer to the load. And this is important! Standardized substations provide the flexibility needed to achieve simplification in other parts of the system. Spot networks, secondary networks and the use of banked secondaries are typical opportunities open to farsighted system planners.

Let these facts be your guide as you plan for the future . . . and let Westinghouse help. Our engineers and complete system planning facilities are at your service. Just call your Westinghouse office or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-97146

WRITE FOR A PRESENTATION OF THIS VALUABLE INFORMATION

"Electric Utility Power Distribution System," B-3905
"Co-ordinated Substations," B-4061

Westinghouse

SYSTEM PLANNING SERVICE

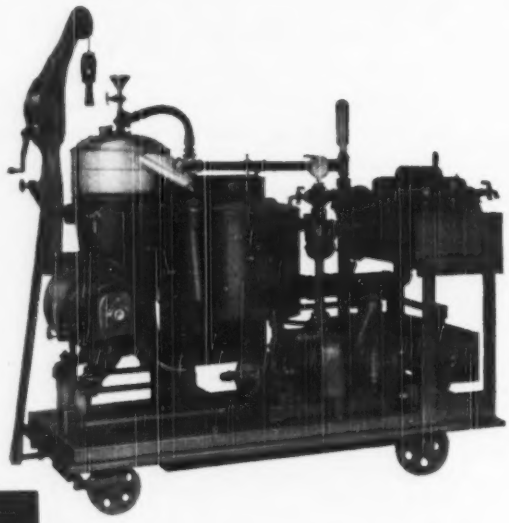
SAFELY ....

raise dielectric with the De Laval

PORTABLE OUTFIT

De Laval Insulating Oil Purifiers provide the means of maintaining a high dielectric that is safer . . . more reliable . . . and economical. In the bowl of the Oil Purifier water is ***continuously*** removed by means of centrifugal force. Because water immediately discharges to waste, and never collects in the bowl, the Purifier operates at constant high efficiency . . . is not rendered suddenly ineffective with consequent danger that a batch of oil in the process of purification will go in an instant from a high to a low dielectric test.

That is only one of the many reasons why De Laval Insulating Oil Purifiers are used by so many of the country's leading power companies. Study the list below . . . then write for additional information.



ADVANTAGES OF DE LAVAL INSULATING OIL PURIFIERS

Constant high purifying efficiency—no shutdowns for cleaning or for renewal of parts during run	Dehydrates at a single pass—no re-running	Safest—continuous discharge of water prevents re-contamination of the insulating oil	Higher daily capacity of purifier saves maintenance costs
More economical to operate	Removes free water without aid of filter press; press used only to remove colloidal carbon	Heater cannot carbonize the oil	Low temperature purification; high dielectric value of oil maintained longer

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 6 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

DE LAVAL

INSULATING OIL PURIFIERS

Pacific Electric BREAKERS Have

The Features You Want

Outdoor Type JCE-17
14.4 kv, 600 amp
100,000 interrupting kva

Type JCE
Oil Circuit Breakers

JCE-17
14.4 kv—600 amp
100,000 int. kva.

JCE-22
600 and 1200 amp
250,000 int. kva;
23 kv — 600 amp
250,000 int. kva

NEMA STANDARDS

Other Pacific Electric Products

Oil Circuit-Breakers from 7.2 kv to 230 kv. Service Restorers 7.2 and 15 kv. Air Break Switches from 7.5 kv to 230 kv. Disconnects from 7.5 to 115 kv. Distribution and Power Fuse Cutouts and Supports. Bus Fittings and Terminals.

1. **Motor-Compressed Closing Springs**—assure positive reclosing from **full-open** position. If control power lost, manual recompression takes but one-half to one minute: normal closing then follows.
2. **Always Full-Energy Closing**—closing power not dependent on system or control voltage—no slow opening or blow-back from sustained fault.
3. **Single-Unit Rotary Contact Structure**—moves as one piece—under no mechanical stress in either open or closed position—easy to inspect.
4. **Simple Interrupter**—a glance shows whether or not it is in order.
5. **Sliding-Shoe Nested Contacts**—easy to inspect—separate surfaces for arcing and load currents—leaf springs apply nearly constant pressure so require no adjustment during contact life—wiping-action insures clean contact—no sensitive adjustment required to fix closed position—no mechanical stress on bushings at any time.
6. **Trip Free**—mechanically and electrically, in any position.
7. **Control Current No Greater Than Trip Current**—even for high-speed reclosing, the control current is carried by small-sized wires.
8. **3-Shot Reclosing Timer**—mounted in operating-mechanism cabinet—for all usual duties including cut-off of instantaneous attachment after first reclose, if specified.
9. **Full A-c if Desired**—rectifiers not required—a-c control and series trip available with or without relays.
10. **Shipped Assembled**—tested and adjusted at the factory.

Get All Facts . .

Call

PACIFIC ELECTRIC MFG. CORPORATION

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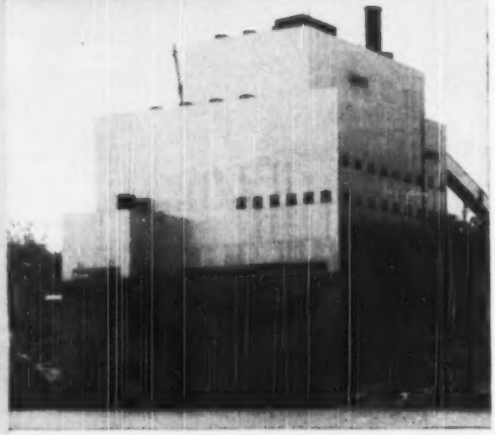
PIERCE G. FREDERICKS C. H. CUTLER THE WALTER ROSS CO. LEONARD M. MYERS MYERS SWENSEN KOEHNER & ROSS

Other Representatives in Principal Cities

RILEY steam generating and Riley pulverized coal equipment was selected for the new Riverton Station of the Northern Virginia Power Co. Because of the outstandingly satisfactory and efficient performance of Riley steam generating units, Riley units are being installed by many of the country's leading power companies.

Users of Riley equipment will assure you that you will also be very happy with Riley equipment and Riley's handling of your contract, when you join the very definite swing to Riley by power and industrial companies. The performance of Riley equipment in plants warrants a thorough investigation of this equipment by you when you are considering the installation of boiler or fuel burning equipment.



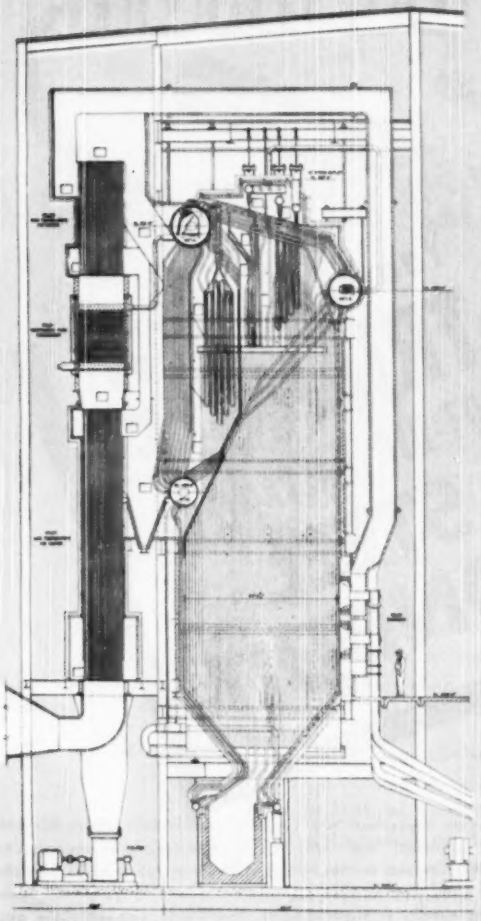
RILEY

STOKER CORPORATION, WORCESTER, MASS.

Boston Cincinnati New York Atlanta Philadelphia New Orleans Denver Washington Memphis Salt Lake City Buffalo St. Louis Los Angeles Pittsburgh Kansas City Portland Cleveland St. Paul Seattle Detroit Tulsa Chicago Houston

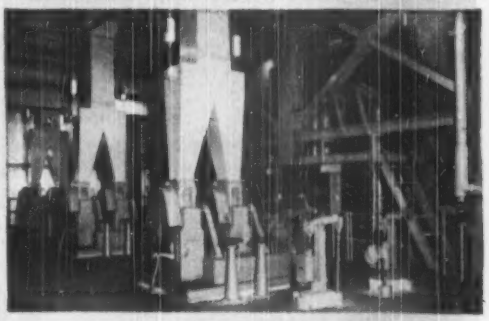
BOILERS • PULVERIZERS • BURNERS • STOKERS • SUPERHEATERS • FLUE GAS SCRUBBERS

RILEY CENTRAL STATION PLANT

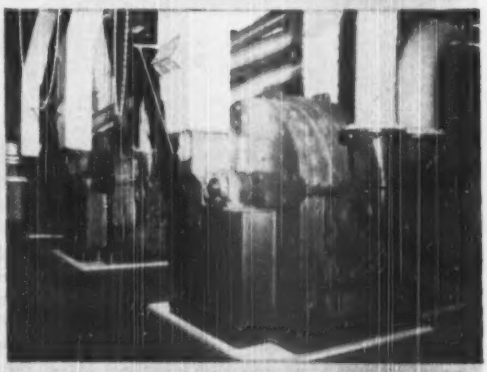


Northern Virginia Power Co., Riverton Station
Winchester, Va.
Sanderson & Porter, Engineers
350,000 lbs./hr. 1,100 lbs. pressure, 900°F.
fired by Riley Pulverizers and Burners.

Steam Capacity	350,000 lbs./hr.
Pressure Superheater Outlet	875 psig.
Steam Temperature	900°F
Boiler Surface	14,210 sq. ft.
Water Wall	12,670 sq. ft.
Air Heater	59,000 sq. ft.
Economizer	4,000 sq. ft.
Furnace Volume	21,170 cu. ft.
Heat Release	20,800 B.T.U.
Efficiency	86.6%



View of operating floor showing Riley pulverized coal feeders and burners.



View of the three Riley pulverizers.

A survey of your Power Plant by a consulting engineer will possibly show ways of making surprisingly large savings in power costs

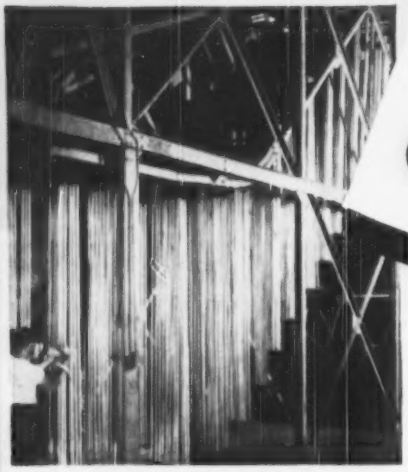
COMPLETE STEAM GENERATING UNITS

. . . it will pay you to visit modern Riley Installations before purchasing Boiler or Fuel Burning Equipment

ECONOMIZERS • WATER-COOLED FURNACES • STEEL-CLAD [illegible] SETTINGS • AIR HEATERS

Because IT MUST BE RIGHT

You can count on TRIANGLE HOT-DIP GALVANIZED STEEL CONDUIT



Lasting Protection – Smooth and uniformly hot-dip galvanized inside and outside, Triangle rigid steel conduit is dipped into special lacquer and baked in this endless conveyor equipment.

Your own experience tells you that conduit fails where the galvanizing is thinnest. That's why Triangle's *uniformity* is important to you. For the severest service, where a single pin-point of penetration could open the way to rapid rust and early failure, users upon users repeatedly specify Triangle conduit. That's why you see more and more "Tristeel" flexible steel conduit, more and more Triangle E.M.T. and rigid steel conduit being used throughout refineries, on bridges over salt water, in increasing numbers of industrial plants. Users' own impartial laboratory tests have repeatedly proved the superiority of Triangle—the conduit that's *uniformly* hot-dip galvanized . . . inside and outside . . . and then further protected by an exclusive new lacquer formulation!

Prove to yourself—in your own laboratory, or on your toughest jobs, that Triangle is the conduit you can count on!

The Trade Mark Of Top Value

TRIANGLE CONDUIT & CABLE CO., INC.

1900 JERSEY AVENUE • NEW BRUNSWICK, NEW JERSEY

IT *MUST* BE RIGHT!

GLAZON BUILDING WIRE • BARE WIRE • ARMORED CABLE • GLAZON NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE, SERVICE DROP, VARNISHED CAMBRIC BRAIDED OR LEADED, TRIOPRENE TRENCH, POWER AND PARKWAY CABLES • RIGID CONDUIT HOT-DIPPED GALVANIZED • ELECTRIC METALLIC THIN WALL CONDUIT • FLEXIBLE STEEL CONDUIT

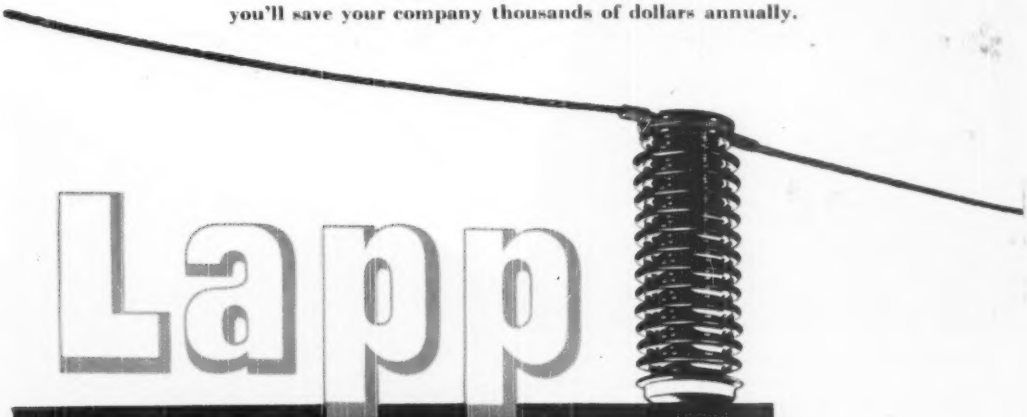
Remember this Ad

Next time you get a bad lightning storm...

•Maybe you think your company has "no trouble" with transmission insulators... How many pin-type insulators do you suppose had to be replaced as the result of your last bad lightning storm? Just "normal" replacement, you may think; "Every piece of equipment calls for a certain amount of maintenance, and insulator costs are low."

We strongly urge you to take a critical and detailed look at those "normal" transmission insulator maintenance costs. We predict that you'll find it a whale of a lot bigger expense item than you suspect. What's our reason for wanting you to know just what that cost item is?

...why, we've got an insulator with a proved record of ability to cut that expense to a tiny fraction of what it now is. The Lapp Line Post. We think that if you'll make a fair comparison of maintenance costs, you'll standardize on Lapp Line Posts for all transmission duty up through 69Kv. And you'll save your company thousands of dollars annually.

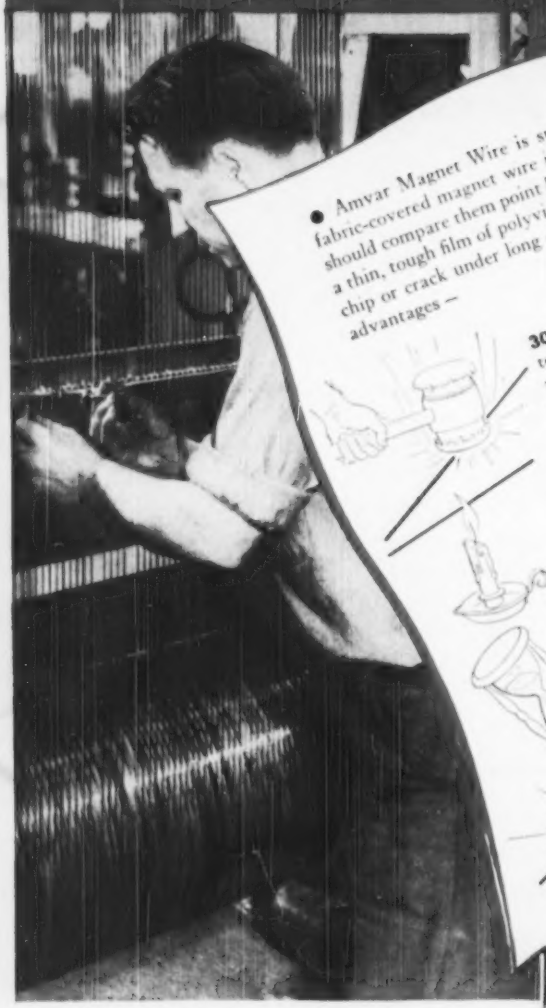


Lapp

LAPP INSULATOR COMPANY INC., LEROY, NEW YORK

SWITCH TO AMVAR

AND IMPROVE YOUR PRODUCT



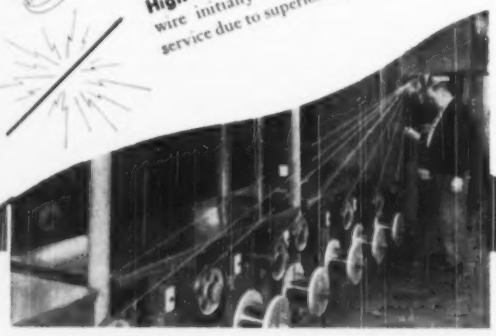
● Amvar Magnet Wire is superior to ordinary enameled and fabric-covered magnet wire in so many different ways that you should compare them point by point. Amvar Wire is coated with a thin, tough film of polyvinal acetal synthetic resin that doesn't chip or crack under long exposure to heat. Here are some of its advantages —

30 times tougher. On a repeated-scrape abrasion tester, Amvar showed an average of 30 times as much resistance to abrasion as enameled magnet wire.

No heat-shock. Amvar does not crack or chip when wound in tight helixes, then subjected to temperatures of 150°C and cooled.

Lasts 24 times longer in heat-aging tests. Tests to determine if the film becomes hard and brittle after heating are made by heating wire to 105°C, 125°C, and 150°C and then bending around a mandrel. Amvar was far superior to enameled wire.

High dielectric strength. Equal to enameled wire initially and superior after years of service due to superior abrasion resistance.

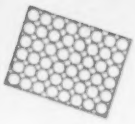


Coating copper wire with Amvar resin results in an extremely tough insulation which does not crack or rupture in service. It has high resistance to heat.

Amvar Magnet Wire is made in precision machines which assure uniform insulation thickness throughout.

MAGNET WIRE

IN 9 DIFFERENT WAYS



Takes less space. Machines and equipment designed with Amvar can be made smaller for the same power. They cost less and give better, longer service.

More flexible. Amvar Wire can be bent around itself without cracking. You can wind coils easier and wires stay put in the coils. Amvar will stretch farther than the copper wire it covers.

High moisture resistance. Amvar is especially desirable for water-proof equipment. It presents a continuous unbroken film that is extremely resistant to moisture.

Excellent solvent resistance. Naphthas, coal-tar derivatives, alcohols, Freon and practically all commonly used solvents have little or no effect on Amvar but many are damaging to enameled wire.

Costs less to use. Magnet wire is bought by the pound but used by the foot and you get more feet per pound of Amvar Wire than you do of any of the fibrous-coated wires. What's more, Amvar is more flexible. It assures many production savings through faster winding speeds, fewer rejects, and less space requirements.

Sizes available. Round wire in sizes from No. 8 to 40 A.W.G. and in single to quadruple insulation thickness.

Send coupon for complete information

American Steel and Wire Company
Room 408, Rockefeller Building
Cleveland 13, Ohio

Please send me more information on Amvar Magnet Wire.

Name.....

Position.....

Company.....

Street.....

City.....State.....

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

AMVAR MAGNET WIRE

UNITED STATES STEEL

G.E.'s 9574 all-purpose* insulating varnish provides BETTER BONDING BETTER PENETRATION NO SLUDGING

Mr. Guy W. Probst

That's what Guy W. Probst, owner of the Lockhaven Electric Repair Co., Lockhaven, Pa., says about General Electric's 9574. Here is his statement:

"G-E all-purpose insulating varnish 9574 gives you a cover coat you can see and that fills up between the Formex wires. I've had very good success with it on armatures up to 2000 RPM. On formed coils I can bake before forming and the turns don't come apart when you pull the coil. I've had no trouble with sludging, and all my work is hot dipped. I find that I only use about half as much 1201 Glyptal as a cover coat on 9574 as I had to use over the varnish I had been using, and I get higher gloss and better bonding when 1201 is used over 9574."

**G-E 9574 gives excellent results on all types of coils except extra-high-speed armatures. It is one of G.E.'s complete line of electrical insulating materials, including adhesives, wedges, cements, compounds, cords and twines, sleeving, wire enamels, mica, papers and fibers, permafils, tapes, tubing, varnished cloths, varnishes.*

EASY TO USE

BAKES AT LOWER TEMPERATURES than is possible with most other synthetic varnishes.

PENETRATES EASILY into the deepest coils.

NO SPECIAL THINNER required (just petroleum spirits).

STABLE—will not tend to harden in the tank.

SEND FOR BULLETIN!

If you haven't yet tried G-E 9574, get in touch with your local G-E Distributor, or write for our new bulletin to Section K-2, Chemical Department, General Electric Company, Pittsfield, Mass.

You can put your confidence in

GENERAL ELECTRIC

CD50-K2

*DOUBLE VENTING of the fuse tube is a principle pioneered by Southern States. As an outstanding feature on all SS open type cutouts and power fuses for more than two decades, DOUBLE VENTING has been proven through repeated field tests and years of application. At left is unretouched photograph illustrating "DOUBLE VENTING" in a test operation of a Southern States Type 33 cutout manufactured in 1930.

Southern States'

DOUBLE VENTING*

BOOSTS INTERRUPTING CAPACITY

And Eliminates Recoil Shock!

15 kv Type 33-D Dropout Cutout

DOUBLE VENTED fuse tubes boost interrupting capacity of Southern States Cutouts to more than 450,000 kva and Expulsion Fuses to more than 1,000,000 kva. The confined gases escape at both ends of the tube, lengthening the arc more rapidly and blowing it outward in both directions. Faster relief of gas pressure permits greater currents to be interrupted without danger of rupturing the tube.

DOUBLE VENTING insures extra years of trouble-free service because "rocket-effect" or recoil from the high velocity of expelled gases is eliminated by the two-way escape of gases. There is no mechanical reaction with possible damaging shock results since the forces of the two escaping gas columns oppose and balance each other.

As loads on your circuits increase and greater interrupting capacity is demanded, you will find an SS cutout or fuse to meet your requirements.

Southern States Equipment Corp.

HAMPTON GEORGIA

Representatives in:

BIRMINGHAM, ALA.	CHICAGO, ILL.	MINNEAPOLIS, MINN.	MEMPHIS, TENN.
LOS ANGELES, CALIF.	EVANSVILLE, IND.	KANSAS CITY, MO.	DALLAS, TEX.
SAN FRANCISCO, CALIF.	VALPARAISO, IND.	ST. LOUIS, MO.	EL PASO, TEX.
DENVER, COLO.	LOUISVILLE, KY.	NEW YORK, N. Y.	HOUSTON, TEX.
WASHINGTON, D. C.	NEW ORLEANS, LA.	CHARLOTTE, N. C.	LUBBOCK, TEX.
JACKSONVILLE, FLA.	SHREVEPORT, LA.	PHILADELPHIA, PA.	SALT LAKE CITY, UTAH
MIAMI, FLA.	BOSTON, MASS.	CHARLESTON, S. C.	SEATTLE, WASH.
ATLANTA, GA.	JACKSON, MICH.	KNOXVILLE, TENN.	MILWAUKEE, WISC.

SYLVANIA Goes After Sales

Incandescent Sales!

The most powerful, all-out Sales-getting Program in SYLVANIA History . . . Big New TV Show . . . Full-page National Ads . . . Premium Deals . . . Direct Mail . . . ALL FOR YOU!

Featuring Bud Collyer in the hilarious quiz show "BEAT THE CLOCK" on CBS-TV.

New Nation-Wide TV Show on 24 stations to tell millions weekly about Sylvania quality products.

From television shows to direct mail campaigns, Sylvania goes all out to keep your 1950 sales soaring.

Get in on this greatest Sylvania sales-promotion program. It's all set to make countless new Sylvania customers.

But don't delay! The advertising is about to run. The show is about to begin. Write for full facts on the Incandescent, Fluorescent and Fixture campaigns NOW! Address Sylvania Electric Products Inc., Dept. L-2409, 1740 Broadway, New York 19, N. Y.

Sales-making Knife Set Offer

Here's the popular knife-set offer as advertised in newspapers and Good Housekeeping magazine. Keeps Sylvania Light Bulbs moving . . . but fast! Urge dealers to build mass floor displays of Sylvania 4-packs. Here's sound merchandising that pays off in steady sales!

A New Brighter Kitchen Lite

And don't miss this big Free Kitchen Lite promotion!

Another sure Sylvania profit maker. Needed in every home. Backed by colorful window and counter display material. Newspaper ad mats, too. ALL FREE!

SYLVANIA

FLUORESCENT TUBES, FIXTURES, SIGN TUBING, WIRING DEVICES; LIGHT BULBS; RADIO TUBES;

for You *with* BOTH BARRELS

YOU GET 50% MORE FROM SYLVANIA FLUORESCENT TUBES!
SYLVANIA FLUORESCENT TUBES ARE 50% BETTER THAN OTHERS!
SYLVANIA ELECTRIC

Fluorescent Sales!

Here's Sylvania's most powerful fluorescent magazine advertising in years. 4 full pages in the Saturday Evening Post, Business Week and other business papers feature the PROOF of Sylvania's 50% "more life."

These pages present a preview of Sylvania's biggest-of-all fall advertising programs.

The new television show will, of course, sell all Sylvania products. Fluorescent Tubes, Fixtures, and Light Bulbs will receive their full share of attention during the commercials on each program.

And in addition to the sales material shown here, Sylvania offers these extra selling aids:

4 New Mail-Campaigns for Wholesalers

These are complete cooperative mail campaigns especially written for the USE of electrical wholesalers. Fully illustrated, they show the advantages of Sylvania Fluorescent Tubes, Commercial Fixtures, Industrial Fixtures, and Birdseye Lamps. Each is packed with facts of interest to your customers.

Free File for Electrical Contractors

A complete file for figuring lighting plans, estimating and selling Sylvania Fluorescent Lighting Fixtures. Comes in a handy, compact folder. FREE to contractors.

Free Fluorescent Maintenance Promotion

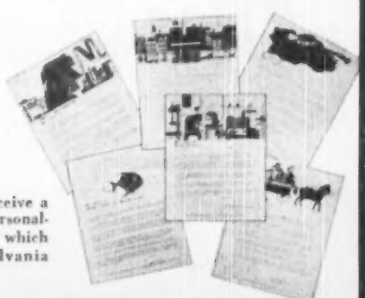
This free cooperative advertising includes full instructions for selling fluorescent maintenance to lighting customers. In addition there are 13 free ad mats, in a choice of sizes, and 9 free radio spot announcements.

For super sales, *stay with SYLVANIA!*

This "Challenge" booklet tells the "How" and "Why" of Sylvania Fluorescent Tubes' longer life and greater brightness. It will be mailed in answer to every inquiry received from the national advertising.

In addition, big space fixture ads in Business Week inform business executives about Sylvania's complete guarantee that covers every fixture, every tube, every part.

Year 'round direct mail campaign to Purchasing Agents is also a part of the Sylvania program. Appealing postal cards, 1 each week for 50 weeks, will keep Purchasing Agents reminded of Sylvania Fluorescent Tubes . . . their efficiency, long life, and dollar savings.



Top Executives will receive a special campaign of personalized letters each one of which tells and sells the Sylvania quality story.

ELECTRIC

TELEVISION PICTURE TUBES; ELECTRONIC PRODUCTS; ELECTRONIC TEST EQUIPMENT; PHOTOLAMPS; TELEVISION SETS

Which costs you *less?*

Why not be sure that the strand you buy today won't rust away . . . and pile up high replacement costs after a few years service?

When you buy Copperweld* Strand your first cost is your last! You eliminate high maintenance and replacement costs because Copperweld can't rust. Every Copperweld wire has a thick copper covering inseparably molten-welded to a strong alloy steel core.

Rely on Copperweld guys and messengers! They retain their original strength, provide permanent, trouble-free support year after year—at lowest annual cost. Write for Engineering Data.

COPPERWELD STEEL COMPANY

Glassport, Pa.

SALES OFFICES IN PRINCIPAL CITIES

*Trade Mark

Copperweld TRADE MARK **NON-RUSTING Strand**

Costs Less because It Lasts Longer

Copperweld Strand is permanently protected against corrosion. Each wire has a thick Copper Covering inseparably Molten Welded to a core of strong Alloy Steel.

1 TO 42 CIRCUITS

SQUARE D MULTI-BREAKERS

for Lighting and Appliance Loads

THERMAL—Coilless MAGNETIC. Thermal element deflects in proportion to temperature of wire insulation resulting from both surrounding air and losses within the conductor. Magnetic element responds instantly to heavy overloads or shorts. Both are needed for complete protection.

REPEAT PROTECTION. Nothing burns out . . . nothing to replace. No live parts are exposed. Anyone can quickly restore service.

NON-TAMPERABLE. Factory test-tripped and sealed. Eliminates well-intentioned but dangerous "doctoring" to accommodate higher loads.

SWITCHING. Circuits can be manually switched "ON" or "OFF" in addition to the automatic "TRIP" and manual "RESET" protective functions.

CONVENIENCE. Multi-breakers are attractive and occupy very little space. Mount them in any location. Provide for future expansion.

Write for Bulletin SA590. Square D Company, 6060 Rivard Street, Detroit 11, Michigan.

flexible

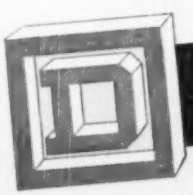
Basic multi-breaker mechanism lends itself to either single or multi-pole construction.

Types MO 1, MO 2 and MO 4 for branch circuits and small homes where high volume and low cost are controlling factors. Similar parts are assembled in 1, 2 and 4 pole blocks.

Type MO 8 for average homes. 4 pole basic block meets minimum requirements. "Ad-On" single pole breakers increase total to 5, 6, 7 and 8 circuits as required.

Types MO 12 and MO 20 for larger homes. "Plug-In" 2 or 4 pole breakers cover the range of 4 to 20 circuits.

MO Panelettes and HMO Panelboards extend range to 42 circuits for stores, institutions, buildings and factories.



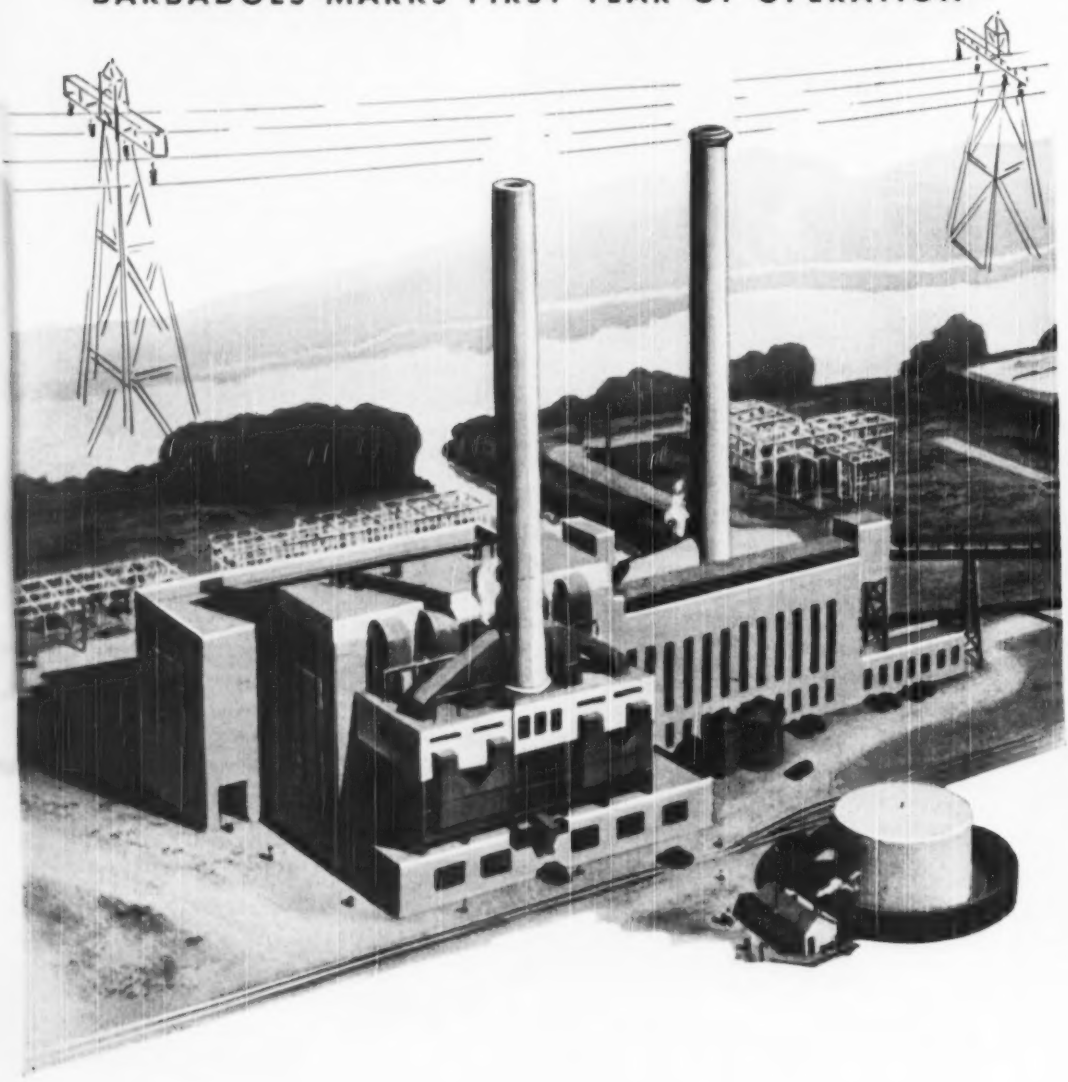
SQUARE D COMPANY

DETROIT · MILWAUKEE · LOS ANGELES

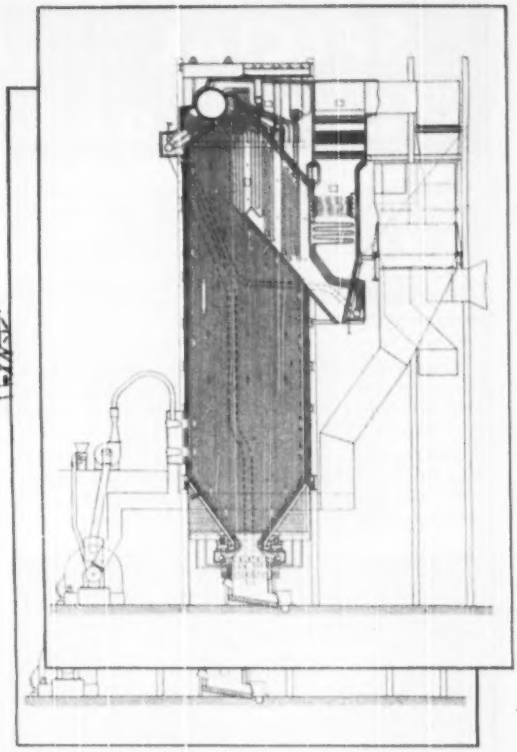
SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

running lines into the future

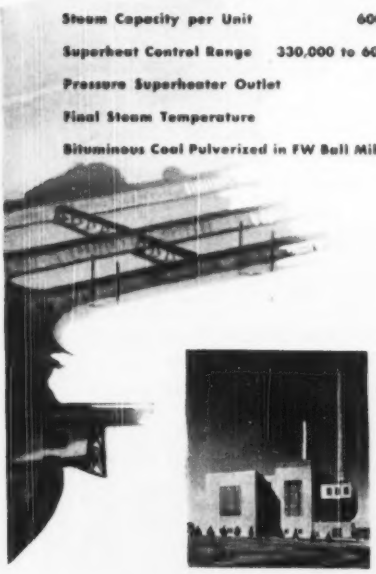
BARBADOES MARKS FIRST YEAR OF OPERATION



Two FOSTER WHEELER steam generators supply steam for the new turbines at BARBADOES STATION of PHILADELPHIA ELECTRIC COMPANY.



Steam Capacity per Unit	600,000 lb per hr
Superheat Control Range	330,000 to 600,000 lb per hr
Pressure Superheater Outlet	825 psi
Final Steam Temperature	900 F
Bituminous Coal Pulverized in FW Ball Mills (two per unit)	



The growth in the supply of electric power keeps pace with the rising population and productivity of Philadelphia's highly industrialized Schuylkill Valley since two 66,000-kilowatt turbo-generator units were installed a year ago in the $24,000,000 expansion of the Philadelphia Electric's Barbadoes Station. This station, which has a total capacity of 180,000 kilowatts — enough for the needs of 500,000 homes — is part of the Company's electric system covering an area of 2,255 square miles and serving more than 900,000 customers.

A total of 1,200,000 lb of steam per hr is supplied to the new turbo-generators by two Foster Wheeler Steam Generators which have a performance record proving the advantages of such Foster Wheeler design features as slag-free furnace arrangement, low draft loss, and efficient heat recovery arrangement. Each unit is fired by two Foster Wheeler Ball Mill Pulverizers with facilities to permit full load operation with coal or gas.

The most advanced techniques permit the handling of 12,000 tons of coal, 30,000,000 pounds of steam and 250,000,000 gallons of water each day at Barbadoes. Only 11 men per shift are required to operate the two new units and steam generators.

FOSTER WHEELER

FOSTER WHEELER CORPORATION · 165 BROADWAY · NEW YORK 6, NEW YORK

SPECIAL TERMINAL BOXES for V-5 and V-10 VARIACS*

VARIAC users have frequently asked for special terminal boxes for facilities impossible to fit in the space provided by the standard "T" terminal box regularly used with all V-5MT, V-5HMT, V-10MT and V-10HMT VARIACS.

We now stock a new, larger rectangular terminal box with sufficient room for almost any special terminal arrangement desired. Unlike the standard "T" box, the new box has a removable cover for easy access to its interior.

The boxes for the V-5 and V-10 series are identical and can be put on existing VARIACS by the customer with no difficulty. Both V-5 and V-10 VARIACS are now stocked with the new terminal cases.

Two boxes are available. The "TC" unit, a plain box with four BX or conduit knockouts and a blank cover, and the "TE" box equipped with a 3-wire outlet, cord and 3-terminal plug and a two-pole switch.

V-5MTC

V-5MTE

SPECIFICATIONS

Dimensions of ALL Boxes: 2¾" wide, 3⅝" high, 2" deep.

TYPE	DESCRIPTION	PRICE
V-5MTC	V-5 VARIAC with 4 knockouts in box	$24.00
V-5MTE	V-5 VARIAC with 3-wire outlet box, 3-wire cord and plug, 2-pole switch	33.50
V-10MTC	V-10 VARIAC with 4 knockouts in box	39.00
V-10MTE	V-10 VARIAC with 3-wire outlet box, 3-wire cord and plug, 2-pole switch	48.50
	BASIC BOXES	
TC BOX	Plain box with 4 BX knockouts, blank cover	$ 3.50
TE BOX	3-wire outlet, 3-wire cord and plug, 2-pole switch	13.50

VARIACS WITH SPECIAL WINDINGS

We receive many requests to modify the winding on VARIACS to furnish output voltages or voltage ranges different from the standard models, or to provide special input or output tap arrangements.

Where the quantities involved are sufficiently large to warrant special production, at a price reasonably low, we welcome your inquiries for VARIACS of this type.

When requesting quotations for these VARIACS please supply complete information to facilitate our prompt reply.

*Trade Name

GENERAL RADIO COMPANY Cambridge 39, Massachusetts

90 West St., New York 6 920 S. Michigan Ave., Chicago 5 1000 N. Seward St., Los Angeles 38

Which NETWORK TRANSFORMER is Best for Your System?

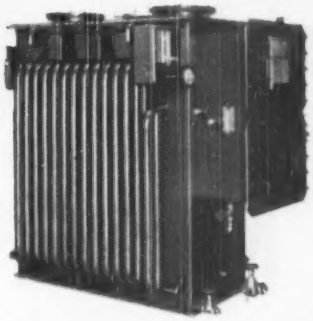
TO HELP YOU select the right transformer for your system, Allis-Chalmers supplies dimensions, ratings and construction data as well as qualified engineering service where required.

Your application problems are further simplified because Allis-Chalmers builds *all three* basic types of Network Transformers in a range of standard ratings. This means that A-C engineers can make unbiased recommendations for your system. It also means that for most installations you eliminate special engineering by selecting from *standard* designs and ratings.

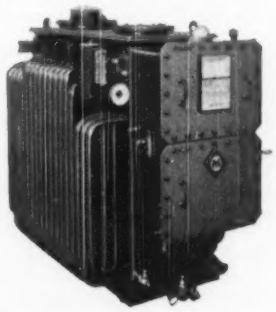
Take advantage of Allis-Chalmers wide transformer range and experience. Call in an Allis-Chalmers representative early in your Network planning stages. Offices in 64 principal cities.

A-3101

ALLIS-CHALMERS, 932A SO. 70 ST.
MILWAUKEE, WIS.

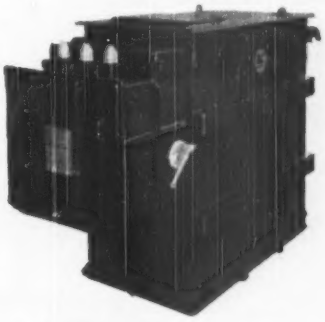


OIL FILLED Widely used because of its over-all economy and proven dependability . . . for either vault or subway installation. Oil-filled design is high in efficiency and reserve thermal capacity. On A-C units, inspection and maintenance is simplified by grouping all accessories at one end of transformer.



CHLOREXTOL LIQUID FILLED Eliminates danger of fire and explosion (*Chlorextol* insulating liquid is non-inflammable), at the same time retains high efficiency and reserve thermal capacity. Often used where safety codes are strict or where additional safety protection is desirable. Vault or subway types.

Chlorextol is an Allis-Chalmers trademark.



NEW SEALED DRY TYPE Requires no internal maintenance whatsoever, completely eliminates fire and explosion hazards. Locate *anywhere* safely. No liquid coolant is necessary, thanks to new Class H insulation. Core and coils are hermetically sealed in atmosphere of inert gas, resulting in long life of insulation.

ALLIS-CHALMERS

Network Transformers—Nearly 1,000,000 KVA Installed

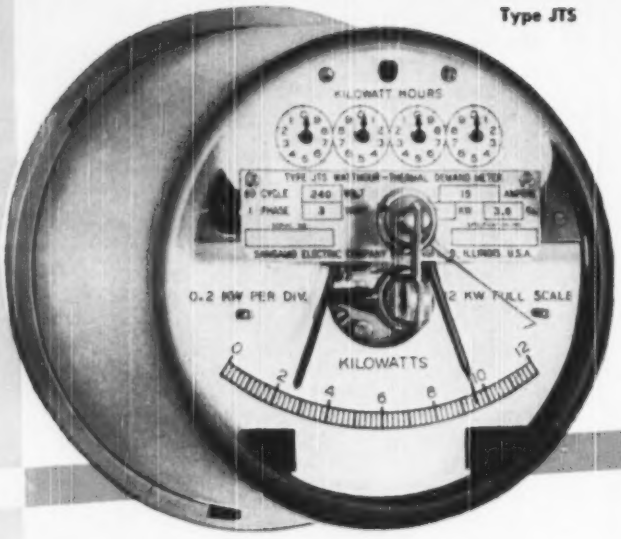
Smaller Size for Convenient Installation

in minimum space

New Sangamo Type JT

Combination Watthour-Thermal Demand Meters

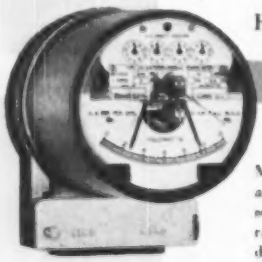
Type JTS



In the new Type JT meter line, Sangamo has combined two *completely independent* elements in a single meter case that requires only the space normally provided for conventional watthour-demand meter installations. Sangamo Type JTA and Type JTS Combination Watthour-Thermal Demand Meters are designed for convenient demand measurements on all types of single-phase loads.

The watthour meter element in the new line incorporates all the service proven features of the standard Sangamo Type J Meter. The thermal meter element design is the result of many years of experience with Lincoln Thermal Demand Meters. These two elements operate completely independently of each other.

For full information, write for Bulletin 431.

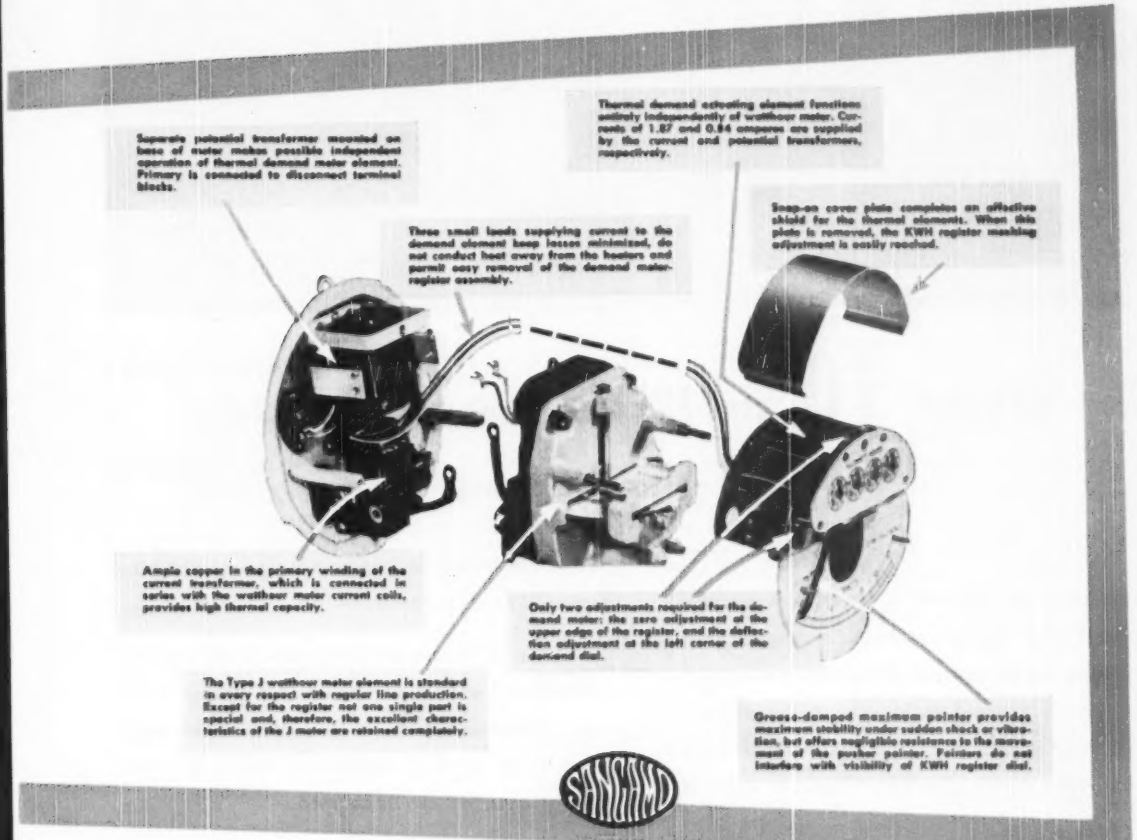


Type JTA

Meter capacities for normal loads not requiring C.T.'s are 15 ampere with full scale demand of 12 KW, and 50 ampere with full scale demand of 24 KW. Full scale demand is 48 KW on meters rated 50 amperes for use with heavy duty sockets. Full scale demand is based on 240 volts. Standard capacities are available for use with current transformers.

DESIGN FEATURES

- The operation of the Type J and Lincoln meter elements are completely independent.
- Established characteristics of both the watthour meter and the demand meter are not affected through the combination of the two functions.
- Losses in leads and heaters of the thermal elements are exceptionally low because of the small current (1.8 amperes) required for full scale indication.
- Thermal element is completely shielded against external heating effects or temperature gradients within the meter.
- Frictionless, grease damped, maximum demand pointer, stabilized against motion from vibration or shock.
- Independent construction, the use of a standard J watthour meter element, and complete accessibility of all parts, including adjustments, minimizes maintenance costs.


Separate potential transformer mounted on base of meter makes possible independent operation of thermal demand meter element. Primary is connected to disconnect terminal blocks.
Thermal demand actuating element functions entirely independently of watthour meter. Currents of 1.87 and 0.84 amperes are supplied by the current and potential transformers, respectively.
Three small leads supplying current to the demand element keep losses minimized, do not conduct heat away from the heaters and permit easy removal of the demand meter-register assembly.
Snap-on cover plate completes an effective shield for the thermal elements. When this plate is removed, the KWH register meshing adjustment is easily reached.
Ample copper in the primary winding of the current transformer, which is connected in series with the watthour meter current coils, provides high thermal capacity.
Only two adjustments required for the demand meter: the zero adjustment at the upper edge of the register, and the deflection adjustment at the left corner of the demand dial.
The Type J watthour meter element is standard in every respect with regular line production. Except for the register not one single part is special and, therefore, the excellent characteristics of the J meter are retained completely.
Grease-damped maximum pointer provides maximum stability under sudden shock or vibration, but offers negligible resistance to the movement of the pusher pointer. Pointers do not interfere with visibility of KWH register dial.

SANGAMO

SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

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HONOLULU • PHILIPPINES • BALKANS • SOUTH AFRICA • UNITED STATES

Over 10 million horsepower

serving throughout the world

The pins in this globe indicate more than fifty countries (not just installations) where Baldwin hydraulic turbines are used. It pictures the background of experience resulting from a century devoted exclusively to the design and manufacture of this type of equipment. It suggests one of the reasons why Baldwin turbines aggregating more than 10 million horsepower capacity have been installed or are on order.

Out of this wealth of experience Baldwin can recommend and build turbines of all types to fit the requirements of your power project. Sizes range from small fractional horsepower wheels up to the largest units that can be shipped.

Bulletin 252 will give you a quick picture of recent important Baldwin installations. Ask for it.

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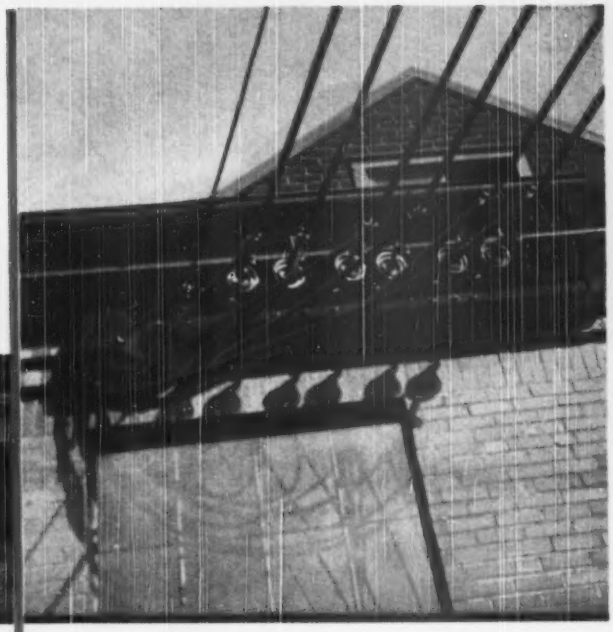
The Baldwin Locomotive Works, Philadelphia 42, Pa., The Pelton Water Wheel Co., 2929 Nineteenth St., San Francisco, Cal., U.S.A. Offices: Chicago, Cleveland, Houston, New York, Philadelphia, Pittsburgh, San Francisco, St. Louis, Washington.

5420

FOR OVERHEAD . . .



OR UNDERGROUND USE

You can depend on tough, long-lasting neoprene-jacketed cable

Neoprene-jacketed cable withstands sunlight, weather, ozone, heat and cold . . . resists chemical vapors in industrial areas. It stands up under abrasion from trees; will not festoon. And underground, a tough, resilient neoprene jacket acts as a protective armor against crushing and denting by settling earth. It's undamaged by acid or alkaline soil; resists the effect of galvanic action, which is destructive to metal sheaths.

So make sure the cable you use is the kind you can depend on—with a jacket of Du Pont neoprene. Although Du Pont does not make finished neoprene products, leading wire and cable manufacturers use neoprene for their quality constructions. Your distributor can supply you. And if you'd like to read about new neoprene applications which may help *you*, we'll gladly put you on our mailing list for "The Neoprene Notebook." Write: E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Div., F-9, Wilmington 98, Delaware.

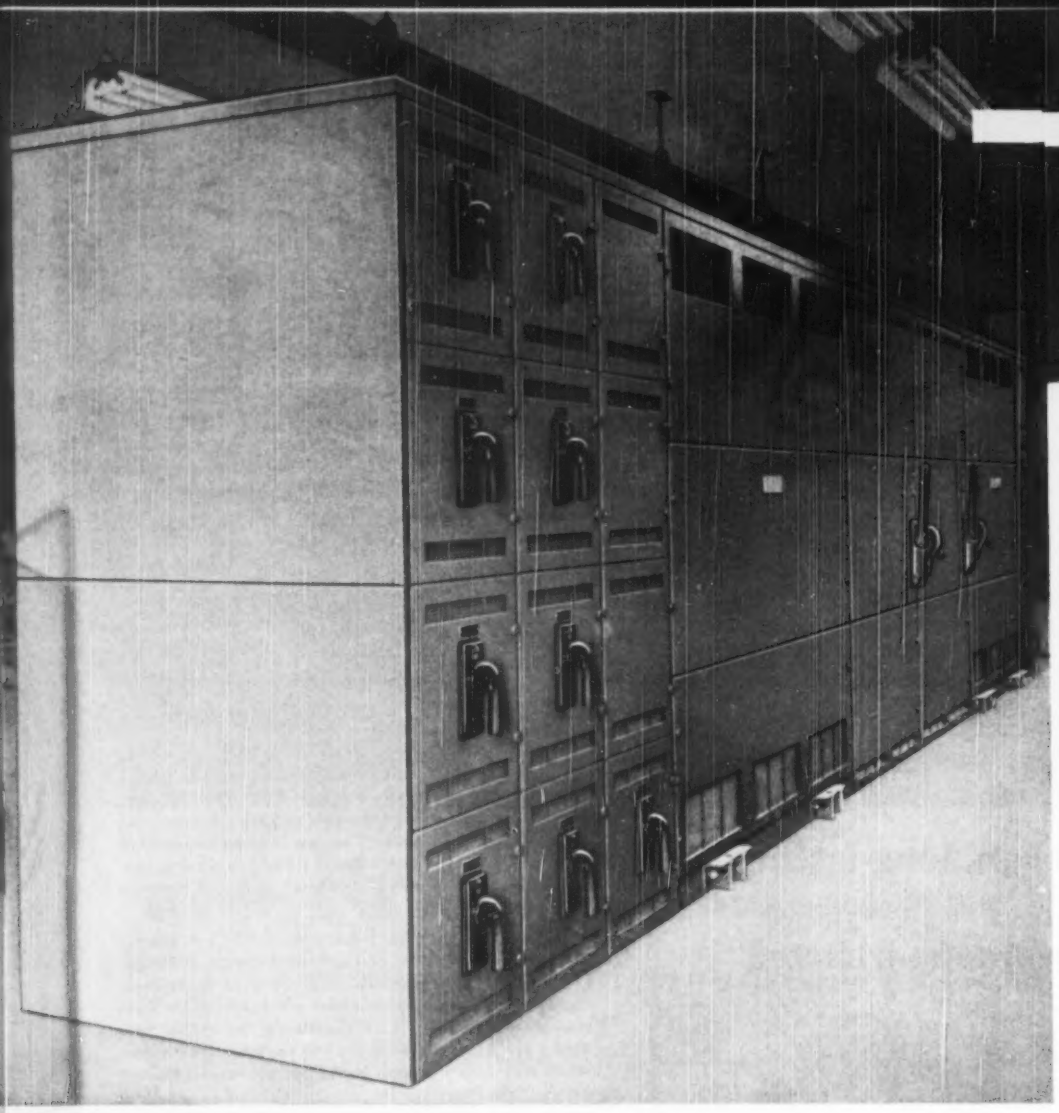
NEOPRENE

The rubber made by Du Pont since 1932

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*



Here is a typical I-T-E indoor Unit Substation with air cooled transformers. Substation arrangement puts primary load break interrupter switches *and* transformers in the center. As load grows, addition of low voltage switchgear to either end is simple and inexpensive.

Uniform appearance of the structure and symmetry of enclosing panels are consistent with the operating excellence of I-T-E switchgear.

Only at I-T-E is *all* of the unit substation enclosure designed, manufactured and assembled in the *same* plant of one division of the company. Quality control is consistently maintained and coordination is assured. Results are simplified installation and improved appearance for *your* plant.

There's an I-T-E Field Application Engineer near you to help you in planning for the future with sound engineering information about I-T-E Unit Substations. Call him today!

I-T-E

For more dependable Switchgear

I-T-E

1 **REDUCED CONDUCTOR INVESTMENT AND MAINTENANCE**

I-T-E Unit Substations distribute low voltage a-c energy to the load with shorter bus or cable runs.

2 **LOWER COST OF LOW VOLTAGE METAL ENCLOSED SWITCHGEAR**

Reduced transformer sizes at load centers require lower interrupting capacity circuit breakers, with resulting savings in switchgear costs.

3 **SMALLER WORK AREA AFFECTED BY POWER INTERRUPTION**

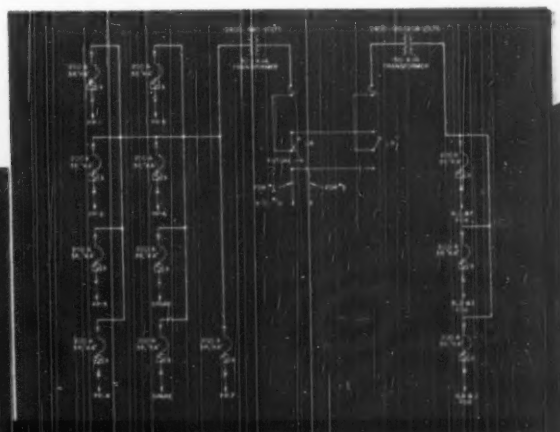
With individual I-T-E Unit Substations spotted at load centers, substations may be moved as load centers shift. Manufacturing processes in other sections of your plant are not affected — production is sectionalized.

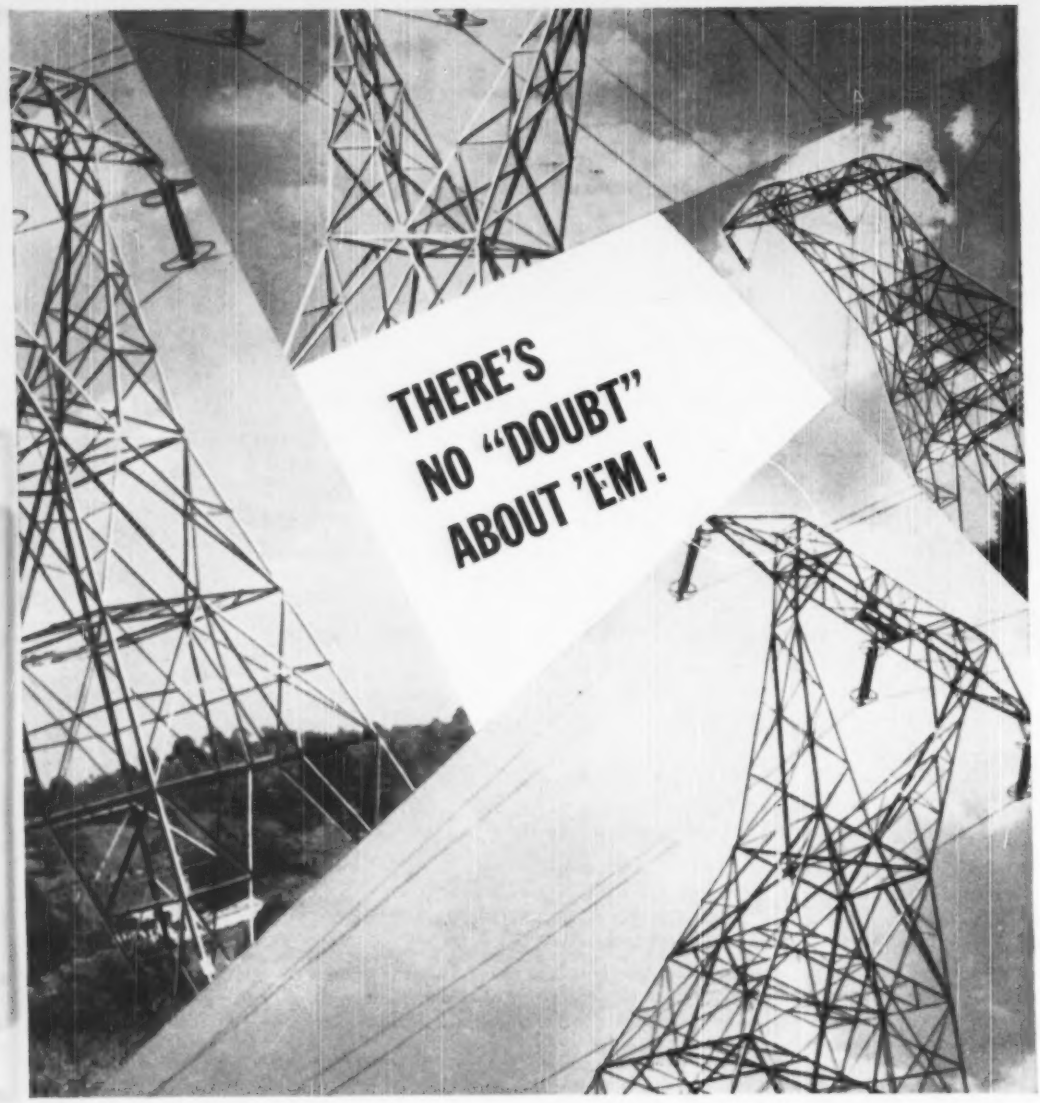
4 **TIME SAVED AT INSTALLATION**

Piecemeal deliveries involve storing, assembling, testing. I-T-E substations are shipped to you as complete packages: factory engineered, assembled, tested before delivery. Time means money — save it!

5 **TIME AND MONEY SAVED IN YOUR ENGINEERING AND PURCHASING DEPARTMENTS**

Reduce your engineering specifications to a simple, one-line diagram — all you need to secure a quotation, complete with physical arrangement drawings and specifications covering all components of the substation: primary switchgear, transformer, secondary switchgear.





When your engineers assign a tower-building job to Blaw-Knox they do so with complete confidence in the outcome. They know their specifications will be incorporated in designs that have proved "right" over many years of service by every important electrical utility in the U. S. . . . If expansion of your high-tension lines is contemplated, ask for estimates which will show you that Blaw-Knox quality is not "premium priced."

BLAW-KNOX DIVISION
OF BLAW-KNOX COMPANY
2013 Farmers Bank Building
Pittsburgh 22, Pa.

BLAW-KNOX TRANSMISSION TOWERS

more KVAR on the pole

the smallest, lightest capacitor on the market

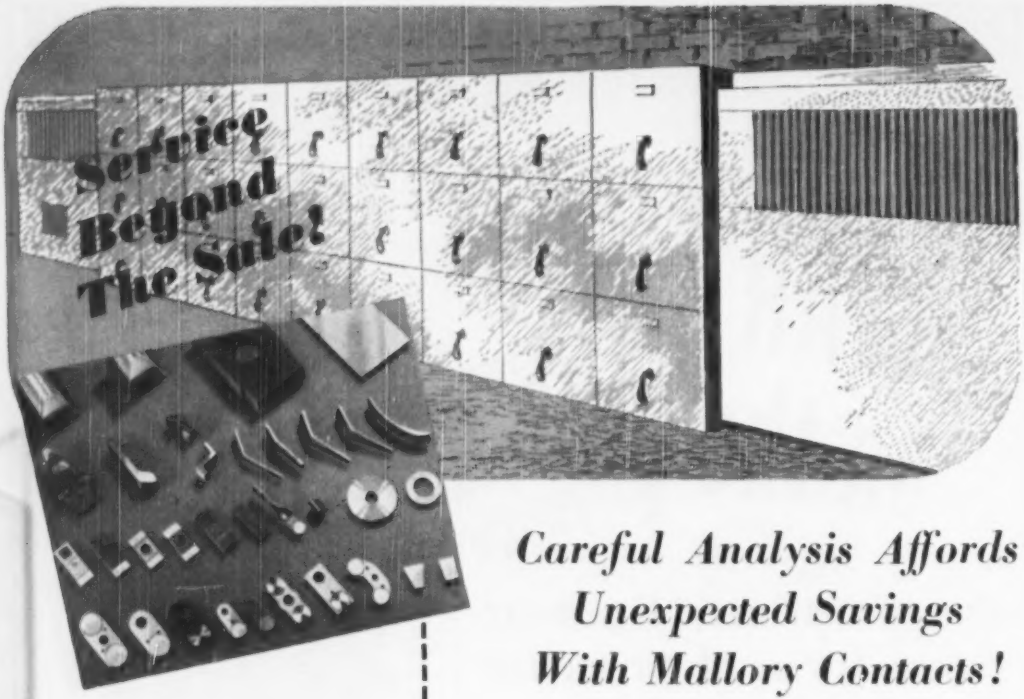
To meet the demands of operators and linemen General Electric especially designed and introduced the 25-kvar capacitor. Every ounce is a working ounce—there is no *waste* space.

Its light weight and small size make it easier to handle and install—permit more units to be installed without increasing pole weight—allow greater clearances for safety factors in crowded locations.

It takes know-how to make good things come in small packages. That's why the 25-kvar capacitor is so small, per kilovar. There's 50 years of know-how behind it.

Outstanding in service, performance and user satisfaction, it saves you money in space and weight. Buy the best. Specify G.E.'s 25-kvar capacitor. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC



Careful Analysis Affords Unexpected Savings With Mallory Contacts!

Elkonite* Contacts

Elkonite is the trade name for a series of contact materials developed by Mallory and manufactured from metal powders. They are best known for their hardness, resistance to mechanical wear and impact, resistance to erosion by arcing, and resistance to sticking.

Elkonite contacts are made by the only method which permits the combining of the desirable features of basic metals which cannot be alloyed. By this means, the high melting points of tungsten, molybdenum, or their carbides, can be combined with the current-carrying ability of silver and copper.

Intensive study by Mallory frequently leads to suggestions for changes in customers' contact assembly designs . . . improving quality and lowering cost.

Recently, Mallory engineers analyzed contact requirements for a manufacturer of transformer tap changers . . . came up with both an improved contact and a more efficient contact finishing operation. A saving of approximately $20,000 per year was passed on to the customer.

That's service beyond the sale!

Mallory contact know-how is at your disposal. What Mallory has done for others can be done for you!

In Canada, made and sold by Johnson Matthey & Mallory, Ltd., 110 Industry St., Toronto 15, Ontario

Electrical Contacts and Contact Assemblies

*Reg. U. S. Pat. Off.

P. R. MALLORY & CO. Inc.
MALLORY
P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

SERVING INDUSTRY WITH

Capacitors	Contacts
Controls	Resistors
Rectifiers	Vibrators
Special Switches	Power Supplies

Resistance Welding Materials

. . . YEARS OF EXPERIENCE
. . . THOUSANDS OF INSTALLATIONS

P-D Fan Stacks have proven themselves more efficient, economical and less expensive than conventional chimneys.

Prat-Daniel's background in both fan and stack design, covers the period of major development in modern power plant development. As the art progressed, improvements have kept P-D Fan Stacks ahead of draft requirements and today provide the ultimate in efficiency for your plant.

Write our project engineers for full details on improving the draft efficiency of your boilers.

Project and Sales Engineers

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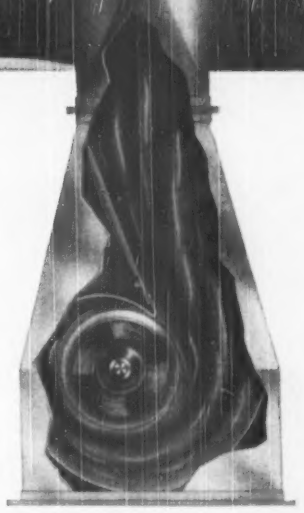
T. C. Chown, Ltd., 1440 St. Catherine Street W., Montreal 25, Quebec



PRAT-DANIEL CORPORATION

75-9 WATER STREET — EAST PORT CHESTER, CONN.

DESIGNERS AND MANUFACTURERS OF POWER PLANT EQUIPMENT FOR OVER 25 YEARS

Even when jobs are "poles apart"...

Dodge "Job-Rated" trucks will cut your costs!

"Job-Rated" ... for low-cost transportation

POWER: . . . 8 great truck engines—each *"Job-Rated"* for *PLUS* power.

ECONOMY: . . . priced with the lowest. *"Job-Rated"* for dependability and long life.

BIGGER PAYLOADS: . . . carry more without overloading axles or springs because of *"Job-Rated" WEIGHT DISTRIBUTION.*

EASIER HANDLING: . . . sharper turning! Parks in tight places. *"Job-Rated"* maneuverability!

COMFORT: . . . widest seats . . . windshield with best vision of any popular truck. Air-cushioned, adjustable "chair-height" seats.

SAFETY: . . . finest truck brakes in the industry . . . hand brake operating independently on propeller shaft on *all* models—½-ton and up.

WHETHER YOU'RE putting up new power lines or making emergency repairs, there's a Dodge *"Job-Rated"* truck to save you money!

Your Dodge trucks will be *"Job-Rated"* from engine to rear axle to fit the load and road conditions of your particular job. It will have an engine that's *"Job-Rated"* to give you plenty of power with top-notch economy.

Small wonder, then, that you'll save money on gas, oil, and upkeep!

And remember, Dodge *"Job-Rated"* trucks are priced with the lowest in every weight class! See your Dodge dealer today . . . for a truck that's *"Job-Rated"* to cut costs!

With all their extra value **DODGE "Job-Rated" TRUCKS** are priced with the lowest

11 YEARS on the Line

✓ No Maintenance
✓ No Downtime

THIS ROCKING CONTACT VOLTAGE REGULATOR has been on the line without downtime or maintenance since installed eleven years ago!" says Mr. Kudick, engineer-in-charge of the East Wells Street Power Station of the Wisconsin Power Company in Milwaukee. "This regulator was installed to hold down voltage peaks . . . it does the job. Performance has been excellent."

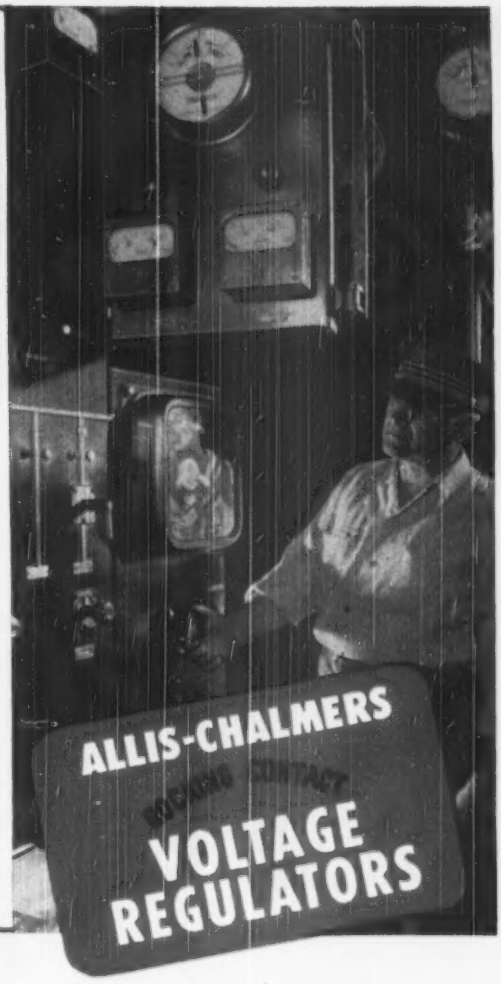
What are reasons behind this typical performance?

1. Allis-Chalmers Rocking Contact Generator Voltage Regulators have no vibrating contacts, no gliding friction, no complex adjustments. The few moving parts are all supported in jeweled bearings.

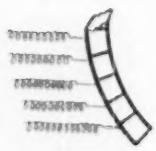
2. They are genuinely precision manufactured. Sectors rock on accurately machined commutator segments that are silver surfaced for positive contact, long life.

If you want long years of trouble-free service, specify *Rocking Contact* Generator Voltage Regulators for your next switchgear or switchboard . . . or replace inefficient regulation now! Call your nearby Allis-Chalmers representative or write direct for more information.

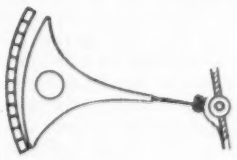
ALLIS-CHALMERS, 932A SO. 70 ST. MILWAUKEE, WIS. A-3148



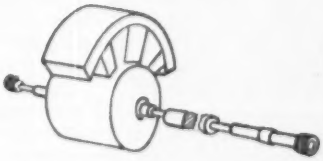
WHY POWER ENGINEERS IN UTILITIES AND INDUSTRY PREFER ALLIS-CHALMERS ROCKING CONTACT REGULATORS:



Each commutator segment is connected to a wire wound resistance element that is accurately designed according to the characteristics of *your* generating equipment. Resistance elements are air cooled —commutator is in dust-tight enclosure.



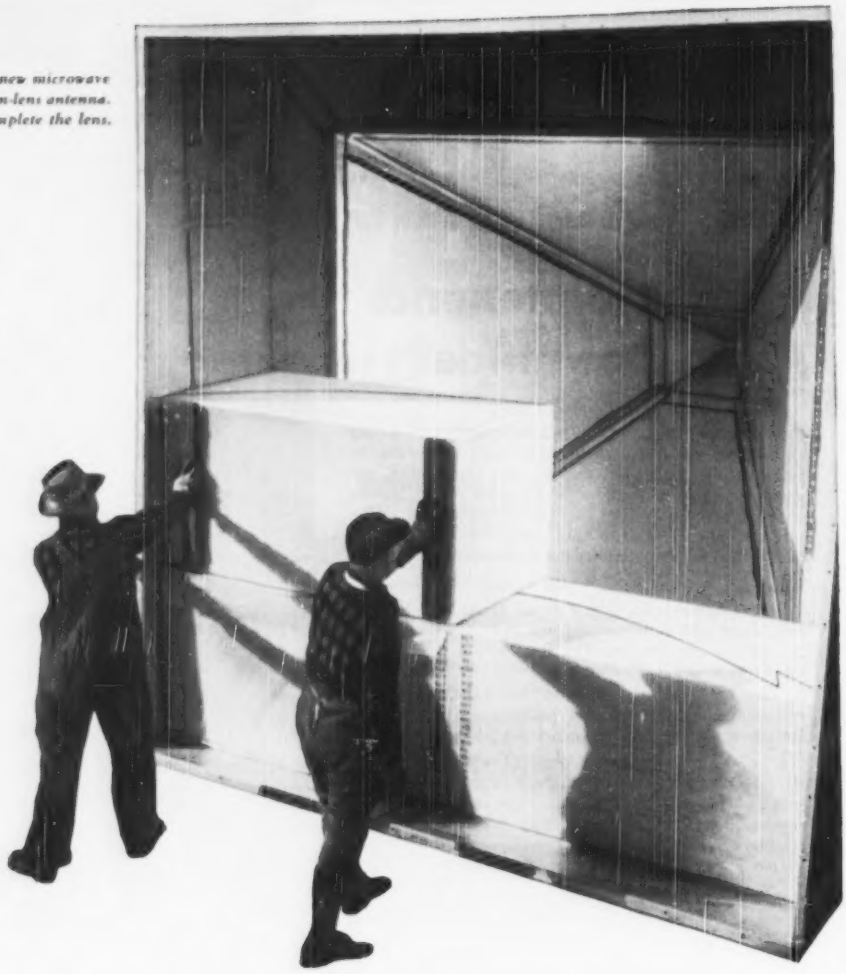
Rocking Contact sector pivots on jeweled bearing . . . has smooth working, hard graphite face that rocks on curved, silver surfaced commutator . . . regulates with slight movement . . . reduces wear . . . maintains accuracy.



Quick acting torque motor drives Rocking Contact Sector . . . has jeweled bearings for rapid, accurate, anti-friction movement. Aluminum rotor reduces inertia . . . increases speed of response.

ALLIS-CHALMERS

Mounting Bell's new microwave lens in a horn-lens antenna. Other blocks will complete the lens.



A focus on better, low-cost telephone service

In the new microwave radio relay system between New York and Chicago, giant lenses shape and aim the wave energy as a searchlight aims a light beam.

Reasoning from the action of molecules in a glass lens which focuses light waves, Bell Laboratories scientists focus a broad band of microwaves by means of an array of metal strips. To support the strips these scientists embedded them in foam plastic which is virtually transparent to microwaves. Rigid and light in weight, the plastic is easily mounted on relay towers.

This unique lens receives waves from a wave guide at the back of the horn. As they pass across the strips, the waves are bent inward, or focused to form a beam like a spotlight. A similar antenna at the next relay station receives the waves and directs them into a wave guide for transmission to amplifiers.

This new lens will help to carry still more television and telephone service over longer distances by microwaves. It's another example of the Bell Telephone Laboratories research which makes your telephone service grow bigger in value while the cost stays low.

Laboratory model of the new lens. A similar arrangement of metal strips is concealed in the foam plastic blocks in the large picture.

BELL TELEPHONE LABORATORIES

Working continually to keep your telephone service big in value and low in cost.

HIRED! A field man

FOR YOUR GOOD RELATIONS DEPARTMENT

Highest Quality Wet-Process Porcelain Shells made on the industry's finest automatic, completely hydraulic presses to assure uniformity and dependability in ALL units.

Not all good relations with the public are confined to the home office. Basically, it starts with the kind of equipment you use. Power failures won't make friends—only influence people to say adverse things about your service. Stay on the "Good" side of Good Relations. Buy Porcelain Products' dated, performance tested suspension insulators. They're built to keep working under the most extreme weather conditions. Write for prices and catalog information on our High Voltage Insulator line.

Porcelain Products, Inc.

PARKERSBURG, WEST VIRGINIA

EXPORT REPRESENTATIVE:

Philips Export Corp., 100 E. 42nd St., New York 17, N. Y. U. S. A. Cable Address: "PHILYORK"

new and special!

low loss 6026 LAMICOID®

developed especially for 60-cycle transformer applications

Here is another MICO special—developed especially for low loss at 60 cycles. It has been found most useful for transformer terminal boards, tap changer boards and lead insulating tubes.

Available in thicknesses up to ¾" inclusive, 6026 LAMICOID resists blistering, splitting or delamination when subjected to a temperature of 250° F. for 36 hours. It assures high creepage resistance and permanent alignment of contacts in tap changer boards. It provides the following excellent combination of physical and electrical properties for transformer applications:

Water absorption (%)	0.89
Specific gravity	1.29
Impact strength	
Izod (ft. lb./in.) edgewise	0.49
Flexural strength (psi) flatwise	15,700
Tensile strength (psi)	13,000
Rockwell hardness (M scale)	106
Compressive strength (psi)	29,700
Bonding strength (lbs.)	970
Insulation resistance (megohms) conditioned for 96 hours at 35 C at 96% R.H.	37
Power factor	
at 1 MC (as received)	0.032
(immersion 24 hr. at 25 C)	0.044
at 60 cycles—as received	
¾" thick	0.012
Dielectric constant	
at 1 MC (as received)	4.07
(immersion 24 hr. at 25 C)	4.23
Loss factor	
at 1 MC (as received)	0.13
(immersion 24 hr. at 25 C)	0.19
Punching quality, heated for 3 min.	Good
Dielectric strength, perpendicular to laminations, (v/m)	
Short Time	710
Step by Step	615
Dielectric Strength, parallel to laminations, (Kv)	
Short Time	83.0

Write for samples and further information about this new LAMICOID and other MICO quality insulating materials.

Mica Insulator Company was born and has grown with the electrical industry. From its inception the company has devoted its efforts to supplying better electrical insulating materials to meet increasingly exacting requirements. For the further development of fine electrical insulation there is no substitute for this experience.

MICA *Insulator* COMPANY

Schenectady 1, New York

Offices in Principal Cities

LAMICOID® (Laminated Plastic) • MICANITE® (Built-up Mica) • EMPIRE® (Varnished Fabrics and Paper) • MUNSELL MICA

What Makes A GOOD Connection?
LISTED BY UNDERWRITERS
1 High Pressure Contact Between Wires: It is fundamental that high pressure contacts are better electrical contacts. Also, it is necessary to have high pressure to keep the wires from sliding, rolling or moving within the connector, as the power lines sway in the wind. High pressure effectively seals the contact surfaces from moisture and oxidation and produces a lasting low resistance connection. Tests show that BLACKBURN Connectors definitely produce these high pressure contacts.
2 Ability to Maintain This High Pressure Contact: The connector must have sufficient strength to make and hold a high pressure connection. It must not yield or stretch and loosen up with time. BLACKBURN Hi-Strength Connectors are made of Duronze, a silicon bronze alloy which is actually stronger than structural steel. They positively test stronger than other connectors when pulled to destruction in a tensile testing machine.
BUILDERS OF QUALITY PRODUCTS FOR 15 YEARS
OVER 100 CONVENIENTLY-LOCATED JOBBERS' STOCKS
BLACKBURN Hi-Strength CONNECTORS
YES, BLACKBURN Hi-Strength Connectors (1) make high pressure connections and (2) have that extra strength required to hold the high pressure connection. It pays to use the best — it pays to use BLACKBURN Connectors.
JASPER BLACKBURN PRODUCTS CORPORATION
First, Madison & Clinton Sts., St. Louis 6, Mo.
Phone CE-3007

"JOB PROVEN" THE WORLD OVER Nicopress

Illustration of No. 51 type Nicopress tool with P. & J. Grooves.

Completed splice on Solid Copper Conductor
Completed splice on Copperweld Conductor
Completed suspension deadend for Copper and Copperweld Conductors
Partially completed reinforcing sleeve on Copperweld

Nicopress sleeves and tools are available in a complete range of sizes for Copper, Copperweld-Copper, A. C. S. R. and Steel Conductors.

Nicopress

is the Registered Trade Mark of The National Telephone Supply Company

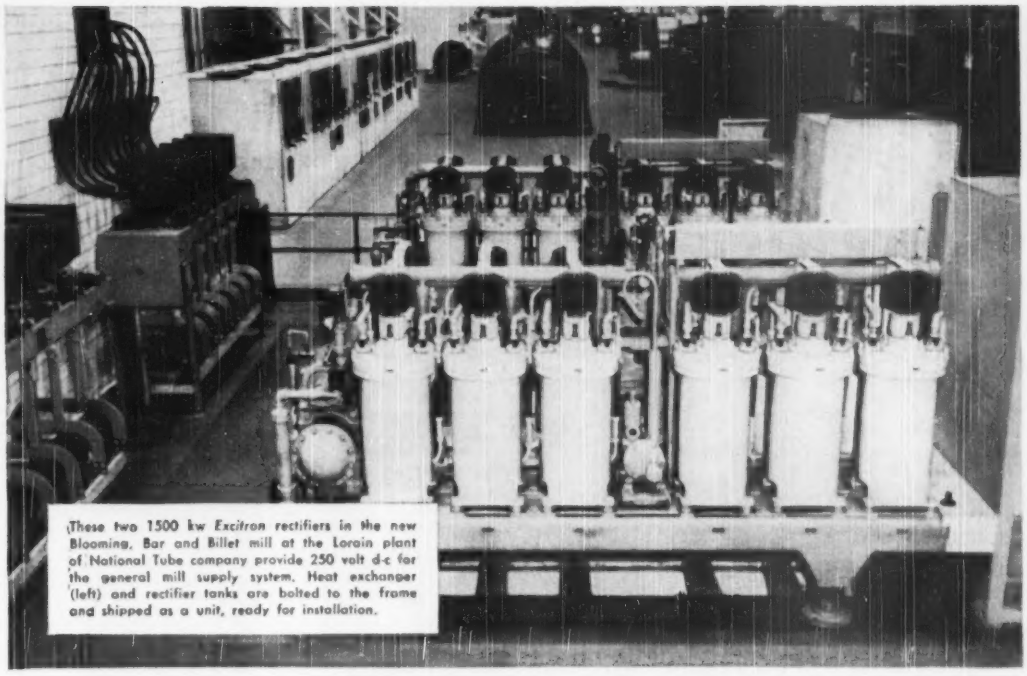
The National Telephone Supply Company

5100 SUPERIOR AVENUE • CLEVELAND 3, OHIO

Canadian Mfr.—H. SLATER CO., LTD., HAMILTON, ONT., CANADA

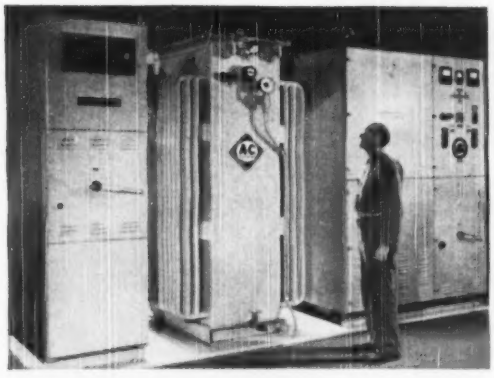
Export Distributor—INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

THE NATIONAL TELEPHONE SUPPLY COMPANY



These two 1500 kw *Excitron* rectifiers in the new Blooming, Bar and Billet mill at the Lorain plant of National Tube company provide 250 volt d-c for the general mill supply system. Heat exchanger (left) and rectifier tanks are bolted to the frame and shipped as a unit, ready for installation.

Mercury Arc Rectifiers Provide D-C with Less Maintenance Downtime



Ideal for dispersed d-c demand, Allis-Chalmers factory packaged sealed tube rectifiers may be readily located at smaller load centers. This 300 kw rectifier includes (left to right) a-c switchgear, transformer, rectifier, and d-c breaker . . . shipped ready to operate.

DOWNTIME FOR MAINTENANCE IS REDUCED when mercury arc rectifiers provide d-c industrial service. There are no commutators and brushes to wear, no bearings to lubricate, no major moving parts.

Mercury arc rectifiers are more economical, too. Conversion efficiency is higher at all loads with large power savings during light load and idling periods. Operation is automatic, with no attendants needed. Light in weight, they may be installed anywhere near the d-c load center with no heavy foundations needed.

Whatever your rectification needs, Allis-Chalmers builds rectifiers to do the job reliably and efficiently. The two Ohio 250 volt d-c installations shown here represent a considerable range in capacity. Allis-Chalmers sealed tube rectifiers are supplied in ratings from 200 to 500 kw (300 kw at left). Heavy duty pump evacuated *Excitron* rectifiers are supplied in ratings from 750 to 2000 kw (1500 kw above).

An Allis-Chalmers representative will be glad to explain in detail how these low maintenance rectifiers can benefit *your* operations. Offices in all major cities.

A-3136

ALLIS-CHALMERS, 932A SO. 70 ST.
MILWAUKEE, WIS.

Regulex and Ruptair are Allis-Chalmers trademarks.

ALLIS-CHALMERS

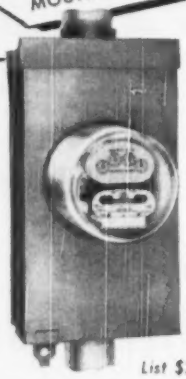
Power, Electrical, Processing Equipment for Iron and Steel

Study Your INSTALLATION ECONOMY

DUNCAN
TYPE D
Drawn Aluminum
MOST ECONOMICAL SOCKET FOR USE WITH SERVICE CABLE.

HORIZONTAL INSTALLATIONS
Terminal jaws easily rotated for horizontal installations. Merely loosen one screw per jaw.
SERVICE EXPANSION
Punch either side for third outlet, using either cable or conduit. Button 0-1-C conduit connector illustrated.
List $2.80
CABLE CONNECTOR
Finest quality, water-tight connector makes a superior weather-proof installation.
SEALING RING
Corrosion resistant aluminum. One piece...snap action... requires no tools.
CONDUCTOR TERMINAL
Wire sizes up to #2 easily installed. Easier barrier keeps position of conductor.

DUNCAN
TYPE H.D.
HEAVY DUTY METER MOUNTING DEVICE



List $28.00

200 amperes of service capacity with self-contained socket type meters.

DUNCAN
TYPE C
Die Cast Aluminum
THE SOCKET FOR CONDUIT

List $3.00

Incorporates all of the Type D socket features, but is supplied with standard threaded holes for use with conduit. Grey paint finish.

DUNCAN Meter Sockets and Heavy Duty Devices have been designed to provide the most economical meter installation for all types and capacities of services. The Type D socket is particularly applicable in areas using principally service cable — and may be used on any conduit installation. The Type C socket is particularly applicable in areas using principally conduit and may be used on any cable installation. Where service capacities range between 100 and 200 amperes, the Duncan Heavy Duty Meter Mounting Device permits the use of self-contained meters, thus eliminating the additional cost of current transformers.

DUNCAN ELECTRIC MFG. CO.

DUNCAN

makers of meters for nearly fifty years

LAFAYETTE **INDIANA**

ANHYDREX INSULATION + NEOPRENE JACKET = 5-POINT PROTECTION for UNDERGROUND NETWORK CABLES

Anhydrex insulation. Neoprene jacket. Here's a combination that's hard to beat for all-around protection against the hazards that menace underground network cables.

It's exclusive in Simplex-ANHYDREX Cables, and it is their assurance to you of the always-reliable performance that network service demands. More than that, the Anhydrex-Neoprene team keeps down weight and diameter, provides excellent flexibility, does away with the need for duct lubricants, and facilitates jointing, tapping, and terminating, all of which add up to low-cost installation and maintenance.

Check the advantages listed here. See if they don't point to the trouble-free operation you're looking for. And if you would like more-complete information, including specification data, about ANHYDREX Underground Cables, just fill in and return the coupon below.

1. **Moisture Resistance**

   Rigid laboratory testing proves that Anhydrex insulation will not absorb harmful quantities of water. Throughout many years of service in underground and submarine installations no ANHYDREX Cable has ever failed due to water absorption.

2. **Resistance to the Acids, Alkalies, and Corrosive Chemicals Prevalent in Underground Ducts**

3. **Protection Against Oil, Heat and Flame**

   The neoprene jacket will not support combustion and it effectively resists deterioration by oil and heat.

4. **Elimination of Crystallization and Corrosion**

   Needing no outer metallic coverings, ANHYDREX Cables are not subject to electrolysis nor harmed by vibration, stray or secondary currents.

5. **Resistance to Abrasion and Rough Handling**

   The neoprene jacket is unexcelled for toughness; will withstand even more abuse than the best natural rubber compounds.

Simplex
WIRES & CABLES

SIMPLEX WIRE & CABLE CO.
79 Sidney St., Cambridge 39, Mass.

SIMPLEX WIRE & CABLE CO.
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GENTLEMEN: PLEASE SEND A COPY OF CATALOG 1013 TO:

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When you treat poles and crossarms with creosote oil, you're using a product with records of satisfactory performance that go back nearly a century. You *know* the protection that creosote oil gives under all kinds of service conditions.

And for the finest results from creosote oil treatment, be sure that U·S·S Creosote Oil is used. You'll find no batch-to-batch variation in quality in U·S·S Creosote Oil, for it is the product of continuous processing in the world's largest tar distillation plant.

Whether you treat your own poles or buy treated timber, insist on U·S·S Creosote Oil. Five sales offices are located strategically to give your requirements prompt attention.

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USS

CREOSOTE OIL

UNITED STATES STEEL

First commercial ultrasonic testing of HT-HP power piping shows value of method!

For years power engineers have known that alloy power piping might on occasion contain defects which could not be discovered by inspection methods other than radiography. But rather than adopt the virtually prohibitive expense of radiographing complete lengths of pipe, designers specified relatively high safety factors.

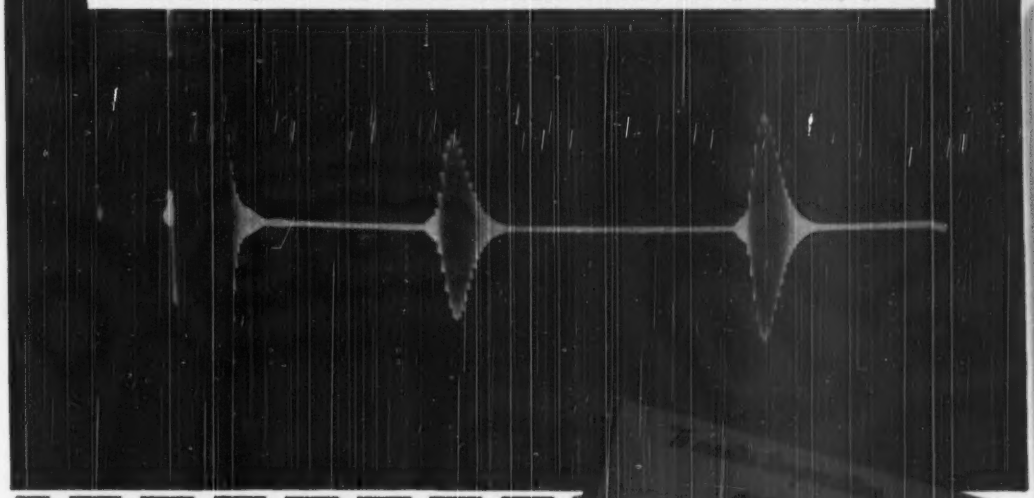
Of course this precaution did not preclude the possibility of defects, and when failures have occured, subsequent investigations have shown that internal cracks were usually the cause of the ruptures.

To meet this problem, investigations were made of inexpensive, non-destructive pipe inspection methods which could reveal hidden defects, and late in 1949, Kellogg, in cooperation with a large turbine manufacturer, presented a practical solution with the introduction of commercial ultrasonic testing of alloy piping.

Ultrasonic exploration of materials, although known for several years, has only recently been attempted on power piping. Indications now are that this technique will prove a successful and low cost means for discovering flaws and, furthermore, for putting a finger on them with startling accuracy. In view of the steadily increasing temperatures and pressures demanded by the economics of modern power generation, the value of this development is obvious.

Specific and continuing studies of this nature are among the many advantages that utility companies gain when they specify high-temperature and high-pressure piping fabricated by M. W. Kellogg.

Illustrated: *Screen pattern on the 'scope of the portable ultrasonic testing equipment currently being used by Kellogg in both shops and field.*



Special studies of unusual problems such as graphitization to assure long life and low maintenance.

Metallurgical research by recognized specialists who have made major contributions in this field.

M. W. KELLOGG

Exclusive Equipment for accurately analyzing stresses in piping and providing unique data for critical installations.

Complete facilities for the fabrication of steel products from simple forgings to specially cast bi-metallic devices.

Top welding performance in shops and in the field by welders accustomed to working under X-Ray checks.

Quality control, devised by metallurgical experts, embracing forming, heat treating and non-destructive testing.

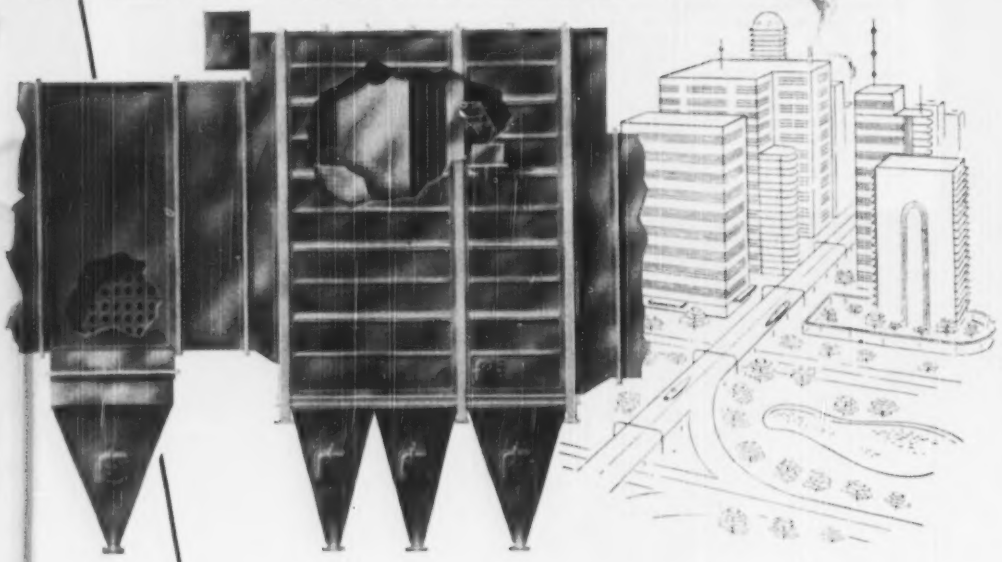
Vessels
Exchangers
Condensors
Process Piping
Forged and Welded Fittings
Radial Brick Chimneys

★

The M. W. Kellogg Company, Inc. (Sub. of Pullman, Incorporated) — Offices in New York, Jersey City, Buffalo, Los Angeles, Tulsa, Houston, Toronto, London and Paris

engineered for the *Future*

THE AEROTEC SERIES COLLECTOR



Your dust collection equipment, a major investment, merits a thorough survey of the present trend toward more stringent dust ordinances.

To plan for the future, a collector should meet today's collection requirements, with provisions made for increasing the efficiency when dust ordinances become more stringent. It is well known that a mechanical collector is economical to operate. Such a collector therefore, that will meet present dust ordinance requirements and serve later as the primary to an electrical secondary, seems the logical choice.

The Aerotec Series Collector provides just this service. The primary, a highly efficient Aerotec Mechanical composed of multiple small diameter tubes, will meet most stringent dust ordinances in effect today. Should collection requirements be increased, the secondary, an Aerotec "Pocket-Type" Electrical Precipitator, is easily added to provide the finest in dust collection efficiency.

The Thermix Corporation, Project and Sales Engineers for the Aerotec Corporation, welcomes the opportunity to prove the sound engineering behind this arrangement . . . a combination engineered for the future.

AEROTEC

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THE THERMIX CORPORATION

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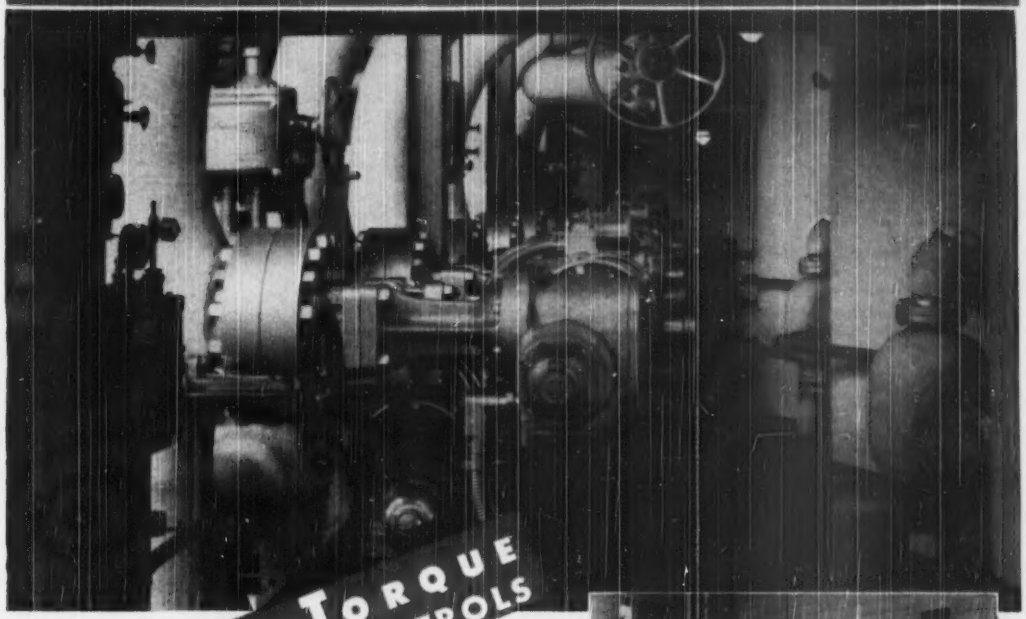
Canadian Affiliates: T. C. CHOWN, LTD., 1440 Saint Catherine St., W., Montreal 25, Quebec; 50 Abell St., Toronto 3, Ontario

THE AEROTEC CORPORATION

GREENWICH, CONN.

WHERE DEPENDABILITY IS A TRUST

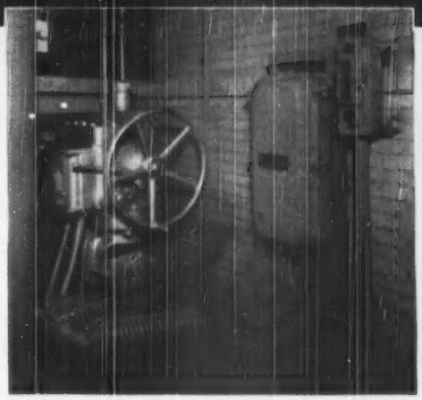


again LIMITORQUE VALVE CONTROLS are the choice

In hundreds of Central Stations, Power Plants, Water and Sewerage Works throughout the world, LimiTorque Controls were chosen for reliability, safety and accuracy.

LimiTorque Remote Control permits one man to operate and to know the status of each valve at a central push-button control station. This is an important safety factor as men are not required to go to high, low or dangerous locations for manual operation. Further, LimiTorque automatically shuts off power should an obstruction occur in closing, thus protecting the valve parts.

LimiTorque is available for all makes and types of valves, and is adaptable to existing equipment. Actuation can be by any available power source . . . electricity, steam, water, gas, oil or air.



Upper: LimiTorque Control on 1750 lb. feed water valves at heaters.

Lower: LimiTorque Control on a King valve with reversing control and push button station.

Our LimiTorque Catalog is yours upon request. Please write on your business letterhead.

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Industrial Gears and Speed Reducers
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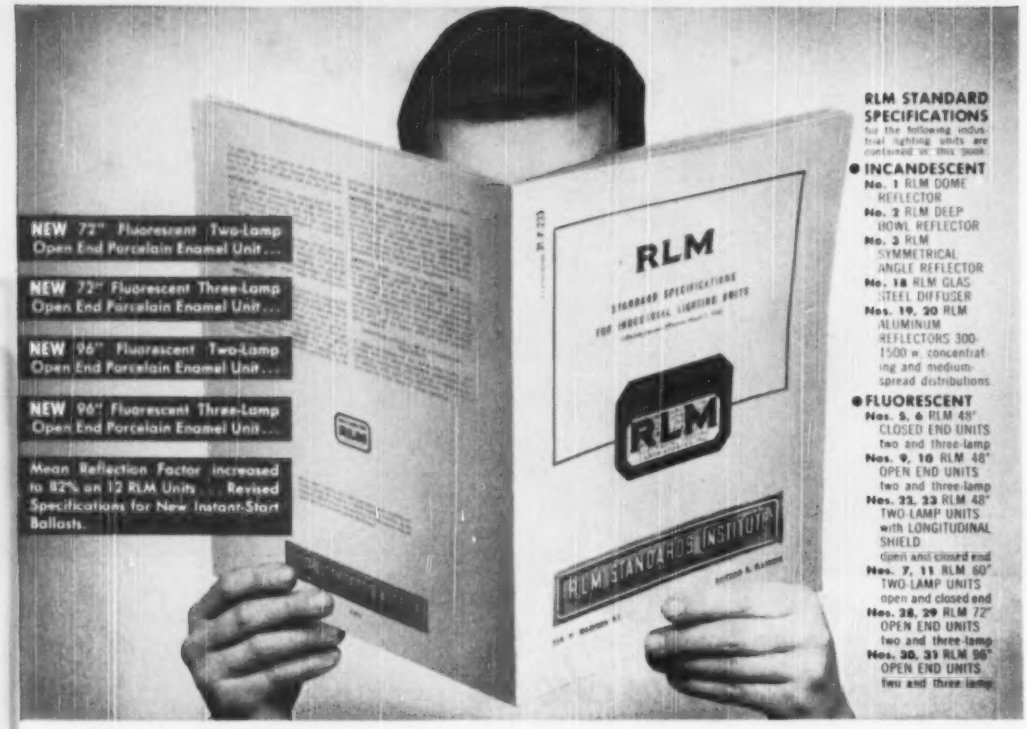
4 NEW RLM SPECIFICATIONS AND IMPORTANT REVISIONS


NEW 72" Fluorescent Two-Lamp Open End Porcelain Enamel Unit...
NEW 72" Fluorescent Three-Lamp Open End Porcelain Enamel Unit...
NEW 96" Fluorescent Two-Lamp Open End Porcelain Enamel Unit...
NEW 96" Fluorescent Three-Lamp Open End Porcelain Enamel Unit...
Mean Reflection Factor increased to 82% on 12 RLM Units . . . Revised Specifications for New Instant-Start Ballasts.
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STANDARD SPECIFICATIONS FOR INDUSTRIAL LIGHTING UNITS
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Nos. 19, 20 RLM ALUMINUM REFLECTORS 300-1500 w. concentrating and medium-spread distributions
FLUORESCENT
Nos. 5, 6 RLM 48" CLOSED END UNITS two and three-lamp
Nos. 9, 10 RLM 48" OPEN END UNITS two and three-lamp
Nos. 22, 23 RLM 48" TWO-LAMP UNITS with LONGITUDINAL SHIELD open and closed end
Nos. 7, 11 RLM 60" TWO-LAMP UNITS open and closed end
Nos. 28, 29 RLM 72" OPEN END UNITS two and three-lamp
Nos. 30, 31 RLM 96" OPEN END UNITS two and three-lamp

This New, Free Book of RLM Specifications Gives You the Up-To-Date Information Needed for BETTER PLANNED LIGHTING

For Better Planned Lighting, everyone who specifies, recommends, buys or sells industrial lighting equipment needs a copy of this new book, officially revised on March 1, 1950 and just off the press. It contains nineteen officially approved RLM Specifications. This book is a valuable aid in measuring illumination, construction and performance standards which are basic to lighting equipment efficiency, economy and ease of maintenance.

New RLM Slimline Lamp Units Included are 4 important, newly-established RLM Standards (Nos. 28-31) for industrial lighting units, designed to utilize the new, longer-length Slimline Fluorescent Lamps. Equipment conforming to these standards and bearing the RLM Label is now available. The minimum RLM Standards established for these Slimline industrial units are based upon extensive tests which have indicated these standards to be essential to satisfactory, efficient and economical performance.

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The letters RLM stand for Reflector and Lighting Equipment Manufacturers

R-0139

ALL THE TOOLS YOUR LINEMEN NEED

FROM ONE NEAR-BY SOURCE!

they can go anywhere

Via Graybar, you can get performance-proved FWD trucks, with digger, derrick, or winch — equipped as you wish for any line construction or maintenance job. Your choice of body styles and sizes. These rugged trucks are built with the power to reach the hard-to-get-at construction and maintenance jobs. Trailers and dinkies also are in the Graybar line of "everything on wheels" for pole-line projects.

time-saving tools

From pliers to pike poles, clamps to cable cars, tree trimmers to tamping bars—Graybar offers a complete range of tools for every line job. Every product distributed by Graybar is well known and approved by linemen . . . every product is designed specifically to help linemen do the best work with maximum safety.

safety equipment, too

For handling the "hot" jobs, Graybar has Salisbury rubber line hose, insulator hoods, protective blankets, rubber coats, gloves, and sleeves. From this one convenient source you can also get Chance hot line tools, Klein safety straps, belts, climbers, M.S.A. first-aid kits, and all other items your linemen need for safety and efficiency.

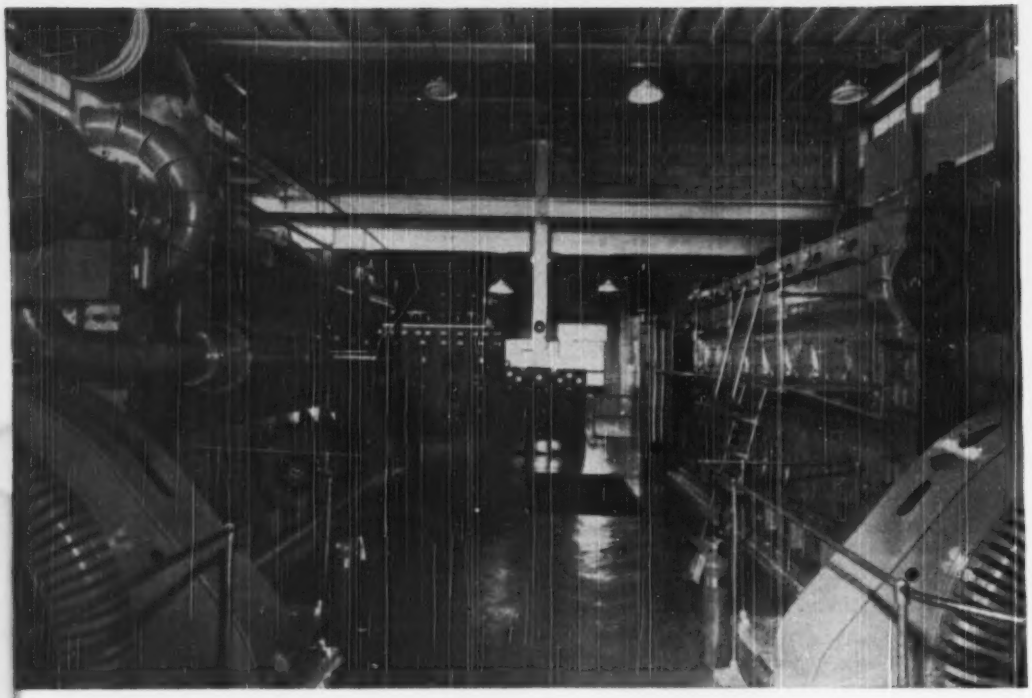
stocks near-by

Stocks of hundreds of pole-line tools and equipment are maintained at Graybar warehouses in over one hundred cities. Often, prompt delivery from these local stocks saves valuable time. Your local Graybar Representative will be glad to give you information about tools or any of the 100,000 other electrical items distributed by Graybar. For special help on difficult problems, an experienced Graybar Outside Construction Specialist is at your service. *Graybar Electric Company, Executive offices: Graybar Building New York 17, N. Y.* 5066

Everything for your pole lines

Via GraybaR

IN OVER 100 PRINCIPAL CITIES



Superior Diesels Put Costs on the Skids

● A private power company in Wisconsin needed additional generating capacity. And they got it from two supercharged Superior Diesels. Each of these engines develop 1440 hp. at 360 rpm. And each one has a bore and stroke of 14½" x 20" and 1000 KW capacity.

The plant engineers report that both engines have met ever-increasing loads with a very high degree of efficiency. And they are enthusiastic about low fuel and lube oil consumption.

For example, one unit delivered power loads from 500 to 800 KW. During this period the engine averaged 14.55 KWH per gallon of fuel. Today, even though they are not yet operating at their best capacity rating, both engines are generating over 14 KWH per gallon of fuel.

Superior representatives welcome the opportunity of showing how Superior Diesels put power costs on the skids. Why don't you have one of them call at your convenience? There's no obligation, of course. And when you contact us, ask for a copy of *Superior Diesel For Stationary Application.*

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SUPERIOR ENGINE DIVISION
Plant and General Sales Office: Springfield, Ohio

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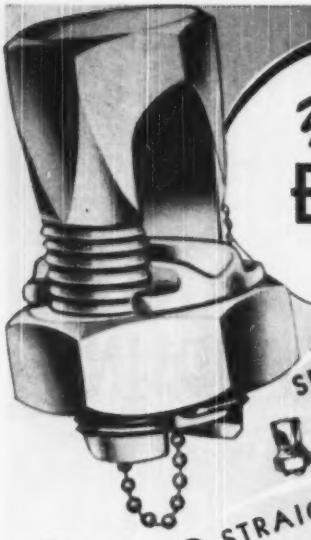
Superior DIESELS

Locomotive · Marine · Oil Field · Stationary

You can find the

EXACT FITTING

you need — in the



SERVICE CONNECTORS

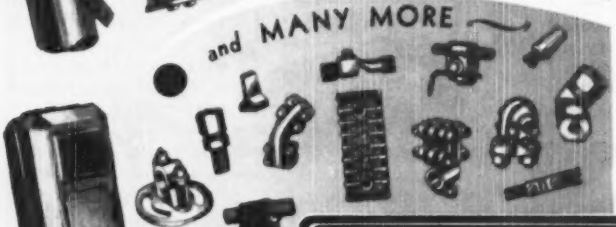
STRAIGHT CONNECTORS

TEES

LUGS

GROUNDING CONNECTORS

and MANY MORE



PENN-UNION Catalog

The conductor fittings shown here can only suggest the wide variety. You'll find practically every good type, in a complete range of sizes.

New connectors are constantly being added - - so when you need a special fitting for an unusual service, tell us about it. Most likely we have exactly what you want.

Better design is a Penn-Union feature that you'll appreciate. For example, note the large gripping surfaces for wrenches, on the service connector shown in the upper left corner. When you use any Penn-Union fitting, you are sure that it is dependable - - mechanically and electrically.

Preferred by Leading Users, who have found that the "Penn-Union" mark on a connector is their best guarantee of unfailing service.

Sold by Leading Wholesalers

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ERIE, PA.

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THE *Complete* LINE OF CONDUCTOR FITTINGS

PENN-UNION

NOW YOU CAN SPLICE OR DEADEND STEEL STRAND IN SECONDS

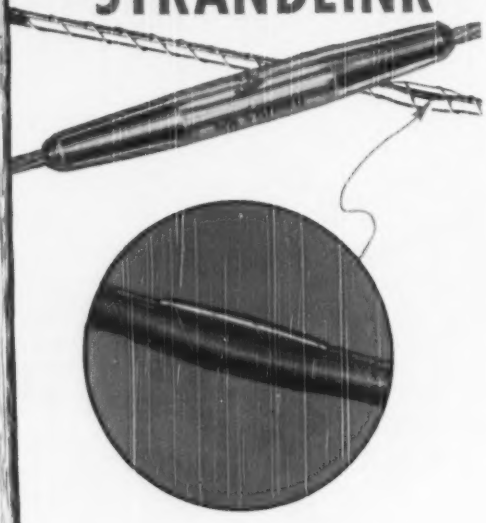
TWO NEW Reliable CONSTRUCTION SPECIALTIES

STRANDVISE

Reliable's two great new construction specialties, STRANDVISE and STRANDLINK, will cut installation time by 90% — save you money in many ways — simplify one of your major operations. STRANDLINK splices messenger wire in seconds, eliminating removal of the lashing machine as with old fashioned nuts, bolts, hardware and johnny balls.

In STRANDVISE and STRANDLINK, Reliable takes the industry's first significant step toward greater installation and relocation economy in a half-century. Investigate these new, modern units yourself. Send for free samples *today*.

STRANDLINK



Jaws on Reliable's new STRANDVISE and STRANDLINK grip surely, will not slip. Hundreds of case-hardened Zinolite-plated steel teeth do the gripping — grip sharply, yet without gashing. Heat treated aluminum cartridges, alloy yokes, and stainless steel bails have strength factors far beyond that of the strand. Assembly is factory treated with corrosion-resistant lubricant. No installing tools needed.

Reliable ELECTRIC COMPANY

3145 CARROLL AVENUE, CHICAGO 12, ILLINOIS

OVER 40 YEARS OF SERVICE TO THE UTILITIES

POWER-LINE CONNECTORS
AND
CONSTRUCTION SPECIALTIES

LOOKS right!

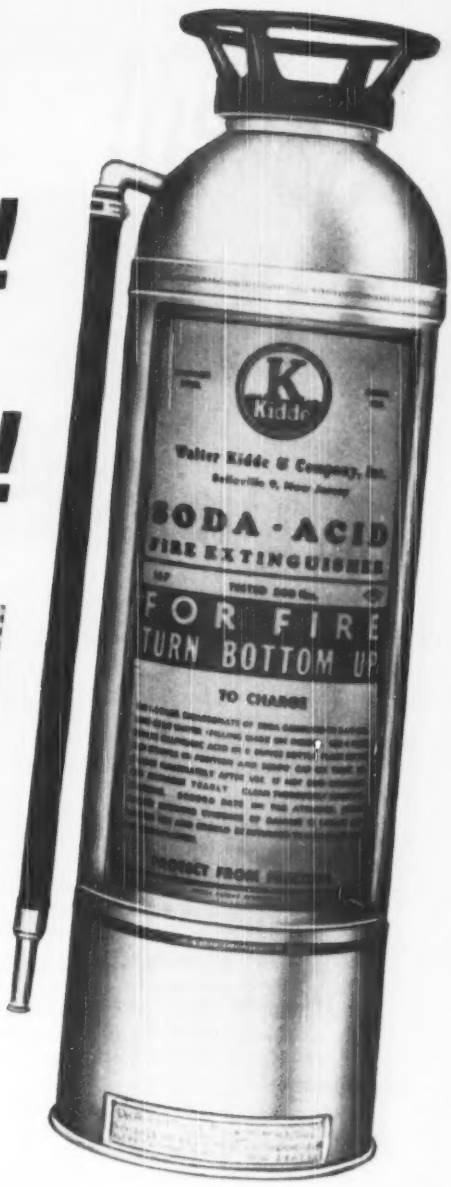
Beautifully constructed of gleaming stainless steel, it looks and performs like a thoroughbred.

WORKS right!

Made stronger, lighter and safer and it will give you many years of trouble-free operation.

PRICED right!

You'll be amazed at how inexpensively you can guard against fire with this superior extinguisher.



Kidde's New 2½ Gallon

WET CHEMICAL STAINLESS STEEL FIRE EXTINGUISHER

gives you more for your money!

All stainless steel shell means greater strength, lighter weight, safer construction, years of reliable service . . . with the same instantaneous action and sure protection against fire that Kidde has always given. Transparent nozzle lets you see at a glance that nozzle passage is clear. Permanent nameplate with directions can *not* fall off.

Take your choice of clear water, soda-acid or foam type and get all the advantages of Kidde construction and Kidde "know how." Also available in an Anti-Freeze type, made of silicon bronze, which eliminates the danger of corrosion that usually results from the Anti-Freeze solution.

Ask your Kidde Dealer or write us for complete information today.

Kidde

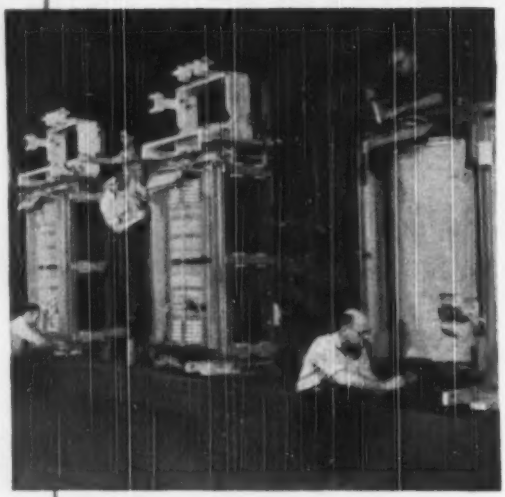
Walter Kidde & Company, Inc., 930 Main St., Belleville 9, N. J.
In Canada: Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.

Saved!

$1950.00

and 10 weeks

on 2 transformers



*Here's an RM (meaning "Repetitive Manufacture") assembly line. By using standardized construction methods, General Electric builds these RM power transformers more economically—delivers them faster. Listed RM ratings are available up to 10,000 kva and 69 kv, with many optional features. All RM transformers up to 2000 kva are produced with Spirakore® construction.

how RM* made this possible

The Customer's Specifications

- —Two, 3-phase transformers
- —1,000 kva each
- —High voltage: 22.9 kv
- —High voltage taps: two 2½% above and two 2½% below 22.9 kv
- —Low voltage: 5040/8720Y-volts with ±10% Automatic Load Ratio Control
- —Impedance: 6%
- —Oil preservation: Sealed tank
- —Special features: provision for future fans; self-contained power supply for LRC.

Our Quotation

Price—$26,516 net
Shipment—23 weeks

Our Alternate Quotation
on RM-standard transformers

Price—$24,566
Shipment—13 weeks

Here's a case where RM specifications matched the customer's original specifications, with only 2 minor variations: RM high-voltage taps were 24,100/23,500—22,300/21,700 (within ¼% of specified taps!). Also, the power supply for LRC was not self-contained—which actually proved preferable for this application.

Customer bought RM, saved nearly two thousand dollars—received faster delivery.

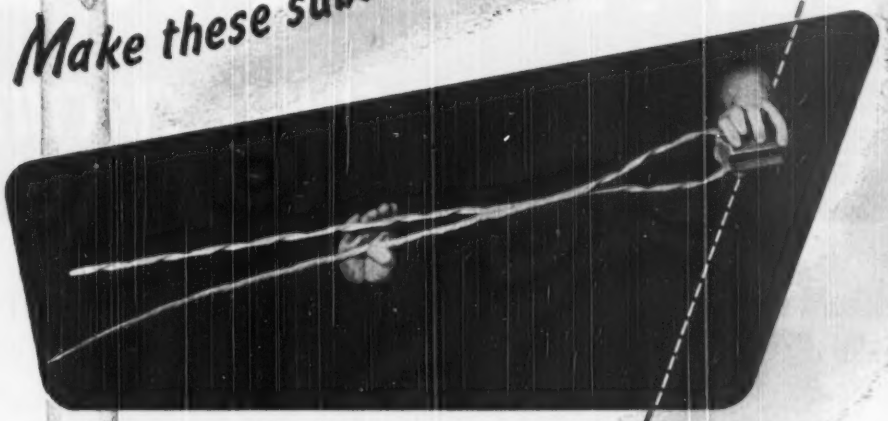
Before you buy your next small power transformer, investigate RM. If standardized transformers can fit your needs—*you, too, will save.*

Ask for catalog GEC-479. Apparatus Dept., General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

401-12

Make these substantial savings on guy wires



• Today, learn how Preformed Guy Wires cut installation time in half . . . save on materials . . . increase strength of guy assemblies.

NO TOOLS. Forget about expensive clamps and tools. Save the time wasted assembling dead ends and tightening bolts. Preformed Armor Rods now come pre-assembled into guy wires. Simply attach to your insulator and angle thimble bolt . . . by hand!

Any lineman . . . regardless of his skill . . . makes a perfect job every time. No tools, no clips, no clamps. You cut installation time in half . . . save on tool costs, too.

LOWER MATERIAL COSTS. You use only half as much strand in Preformed Guy Assemblies. Savings average up to 50% over ordinary guy assemblies.

STRONGER THAN THE STRAND ITSELF. Authoritative tests, by one of the country's largest cable testing laboratories, prove that Preformed Dead Ends, applied by hand, exceed the guy strand in tensile strength! Preformed Dead Ends grip the strand uniformly and over a larger area than ordinary clamps.

START NOW TO MAKE THESE SAVINGS. Benefit by the experience of hundreds of utilities now using Preformed Armor Rods. Get complete data by writing Preformed Line Products Company, 1051 Power Avenue, Cleveland 14, O.

• Preformed armor rods are for use under patent No. 2,275,019 . . . other patents pending.

PREFORMED

PLP LINE PRODUCTS CO.

1051 POWER AVE. • CLEVELAND 14, OHIO

How Would You

ONE OF A SERIES
FUNCTIONAL DESIGN IN SINGLE CIRCUIT UNIT SUBSTATIONS!

INTO A SINGLE CIRCUIT

ALLIS-CHALMERS FORMULA FOR SINGLE-CIRCUIT UNIT SUBSTATION DESIGN:
ACCESSIBILITY + FUNCTIONAL ARRANGEMENT
=√ Easier Maintenance √ Simplified Testing &
Inspection √ Greater Safety!

Design Flexibility

UNIT SUBSTATION?

Would You Design A Substation That Could Not Later Be Modified To Meet Changes In System Requirements? Of Course Not. Would You Arrange Components for Easy Expansion of Feeders — For Easy Conversion in the Field?

CERTAINLY! You would make your substation just as flexible as possible, without sacrificing simplicity. You would want a substation that could, if necessary, be modified economically to accommodate minor system changes.

WHAT DOES THIS *FLEXIBILITY* MEAN TO YOU?

It's Easy to Meet Changing Requirements because the unit can be modified in the field.

Better Service — the *SCS* Substation is versatile . . . capable of giving emergency service under a wide variety of conditions.

Greater Adaptability — It can be easily converted to a multi-circuit unit if necessary.

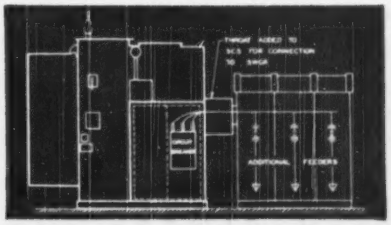
Attractive Allis-Chalmers Unit Substations can be fitted quickly into your distribution system. For more information about *SCS* Unit Substations, call your A-C Sales Office or write direct. A-5043

ALLIS-CHALMERS, 932A SO. 70 ST.
MILWAUKEE, WIS.

SCS is an Allis-Chalmers trademark.

Here is how Allis-Chalmers builds such Flexibility into SCS Unit Substations

1 It is easy to change from overhead to underground outgoing circuits *in the field*. Just connect the flexible leads from the load studs of the current transformer to the new outgoing terminals.



2 Extra feeders can be added easily when necessary. If you know in advance that additional feeders will be required, start with a Multi-Circuit Unit Substation. But when extra feeders are needed unexpectedly, SCS permits easy addition.

3 The SCS Single Circuit Unit Substation can be used as a straight power transformer during modification of switchgear. Just disconnect the outgoing cable from the load studs of the current transformer and connect them to the transformer secondary bushings.

ALLIS-CHALMERS

Pioneers in Load Ratio Control — Originators of 5/8% Step Regulation

"Good service on small orders"...that's only one of the things we mean by Service Plus!

BARS · PLATES · FLOOR PLATE
STRUCTURALS · SHEETS
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STAINLESS
ALLOY STEELS
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TOOLS · EQUIPMENT
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● One customer wrote us: "We are not regular users of steel and the amount purchased was very small, *but* the service rendered by everyone connected with the sale was excellent!"

Whether your order is large or small, we know it is important to you. That's why we try to handle it quickly and courteously, with attention to specific details.

You can also depend on us for a diversified stock of steel and allied products, delivery of those products in the best possible condition and technical advice on their use when you need it. That's what we mean by *Service Plus*.

WHEN YOU DEAL WITH US, YOU GET Service Plus!

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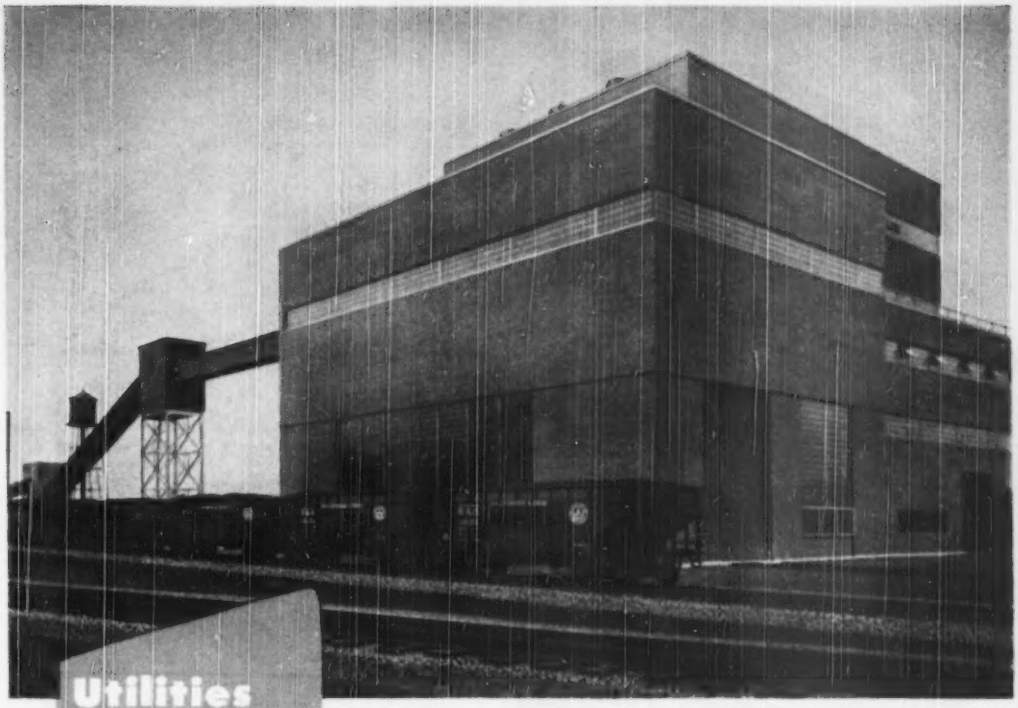
Sales Offices: INDIANAPOLIS · KANSAS CITY, MO. · PHILADELPHIA · ROCKFORD, ILL. · TOLEDO
TULSA · YOUNGSTOWN
Headquarters Offices: 208 S. La Salle St.—Chicago 4, Ill.

UNITED STATES STEEL



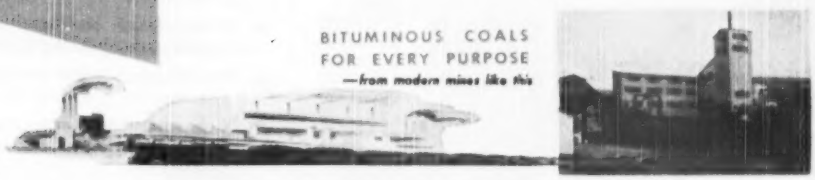
Utilities who know the B&O *expand their plants with confidence!*

BITUMINOUS IS BASIC in the production of light and power. And to many a utility man, that means bituminous mined on the Baltimore & Ohio.

And to executives with programs of expansion on their hands, B & O coals offer an economical, practically *unlimited* supply of fuel. Whether high-, medium-, or low-volatile coals are required, they are found in abundance and wide variety on the B & O. And their accessibility, particularly to the Great Lakes regions and the eastern seaboard, speaks for itself.

The vast, untapped reserves on B & O lines make bituminous a deciding factor in expansion "go aheads." In normal times or in emergencies, you can "bank on B & O bituminous." ***Ask our man!***

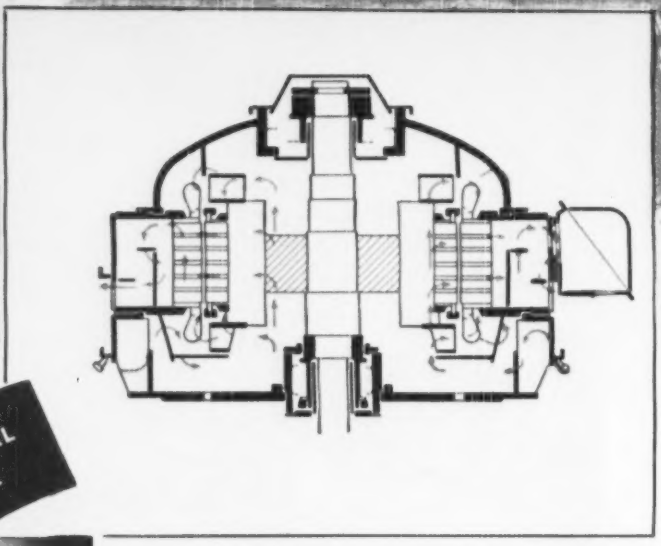
BITUMINOUS COALS
FOR EVERY PURPOSE
—from modern mines like this



BALTIMORE & OHIO RAILROAD

Constantly *doing things* — better!

Moisture gets



VERTICAL TYPE

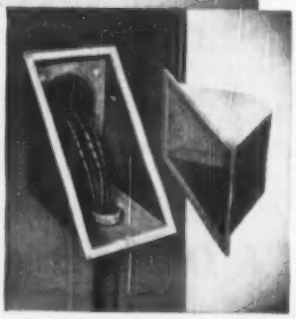
Features of both motors

- Protected against wind-driven rain from all directions.
- Inlets and outlets so designed as to permit wind-driven foreign matter to blow entirely through and out without entering motor.
- Inlets and outlets baffled internally—air is taken into motor at low velocity.
- Screens or filters may be added to inlets.
- No objectionable air recirculation.
- Stator coils with mica wrapper on slot portion for 2300-volt and higher Class "A" insulation.
- Stator coils are vacuum-pressure impregnated.
- Stator and coils after winding given one complete dip and bake, and end turns two additional dips and bakes.
- All steel frame and brackets coated inside and out with rust-inhibiting finish.
- All mechanical joints sealed with gasket and/or a non-hardening sealing compound.

Built in sizes 150 hp 14 pole to 200 hp 4 pole
300 hp to 1000 hp 2 pole

SPLASH-PROOF CONDUIT BOX

- Joint between box and frame gasketed and sealed.
- Cover joint gasketed and sealed.
- Conduit connection at bottom of box sealed during installation.

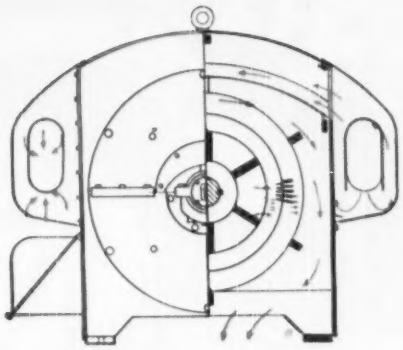


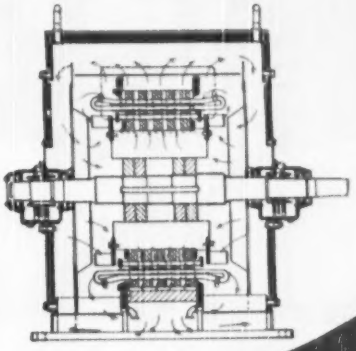
ELLIOTT
RIDGWAY DIVISION
Plants at: JEANNETTE, PA.
DISTRICT OFFICES

IN MOTORS, IT'S ELLIOTT *all*

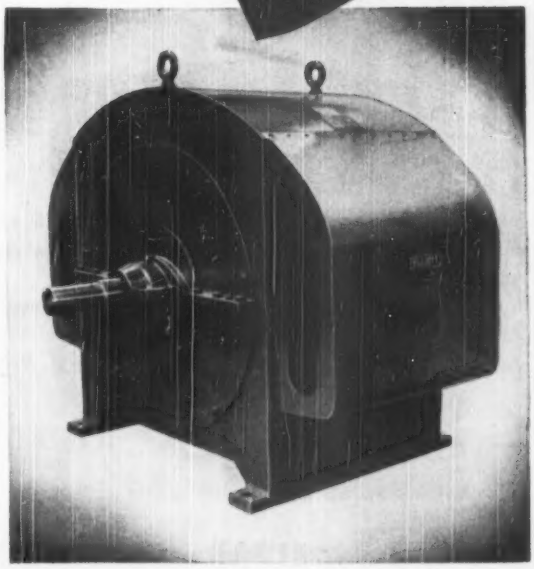
the STOP sign in these...

ELLIOTT outdoor SPLASH-PROOF MOTORS





HORIZONTAL TYPE



In Vertical type

- Normal mounting above driven unit well up from the ground, makes permissible air inlet at bottom of motor.
- Uniformly cooled—fan at bottom cools bottom half of motor—fan at top of rotor pulls air up through spider arms. Air discharges after passing through top end windings to cool top half of motor.

In Horizontal type

- Requires only simple standard foundation or base—no special ducts nor cored openings needed.
- Seal split ring—oiled sleeve bearings, or anti-friction bearings.

For complete details contact your nearest Elliott Company District Office, or write us.

ELLIOTT COMPANY

RIDGWAY, PA. DEPT. ER

RIDGWAY, PA. • AMPERE, N. J. • SPRINGFIELD, O. • NEWARK, N. J.

IN ALL PRINCIPAL CITIES

the way from 1 hp up . . .

service drops

Unless you figure them in aluminum, you don't

figure low

Figure a thousand feet of service drop cable both ways—in aluminum and in copper. Then take a good look at the savings you can get with *aluminum*.

For names of manufacturers and copy of "Questions and Answers About Aluminum Conductors", call your nearby Alcoa Sales Office, or write ALUMINUM COMPANY OF AMERICA, 1786J Gulf Bldg., Pittsburgh 19, Pa.

Aluminum Conductors

ALCOA

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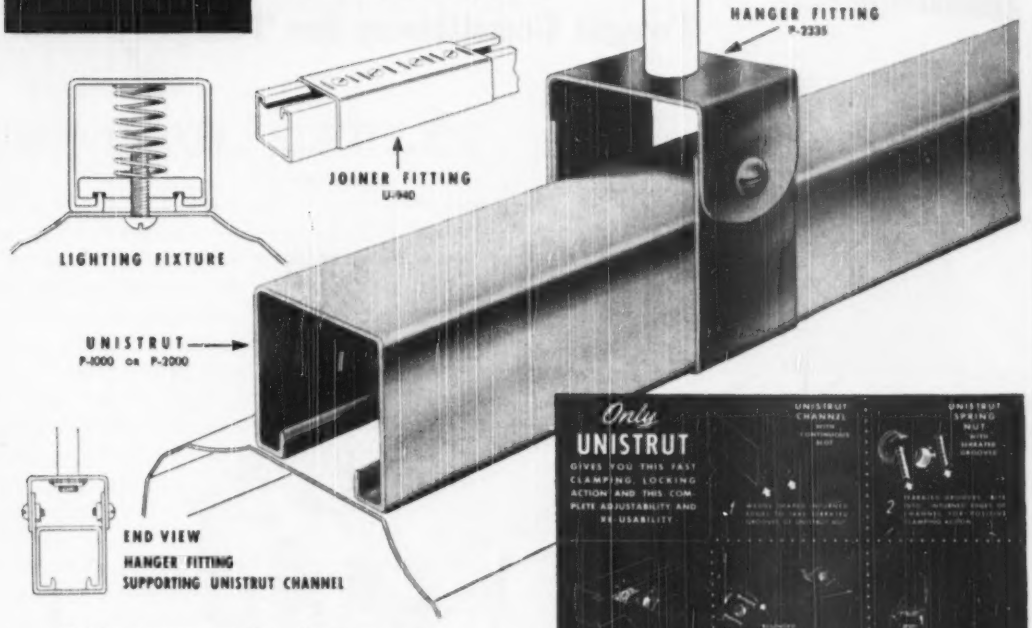
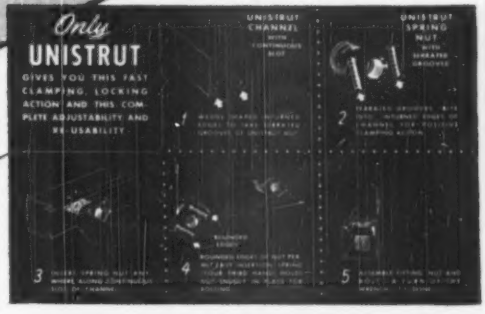
For Perfect Alignment, Safety and Low Cost USE UNISTRUT

The Completely Modern Method of Supporting Fluorescent Fixtures!

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UNISTRUT SPRING NUT

Unistrut assures perfect alignment, requires fewer hanger stems and canopies, is completely adjustable, saves installation time, gives added safety and improved appearance. Unistrut is fully tested and proved by contractors on thousands of installations demanding the finest in lighting.

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2327587 2363382
2329815 2380379
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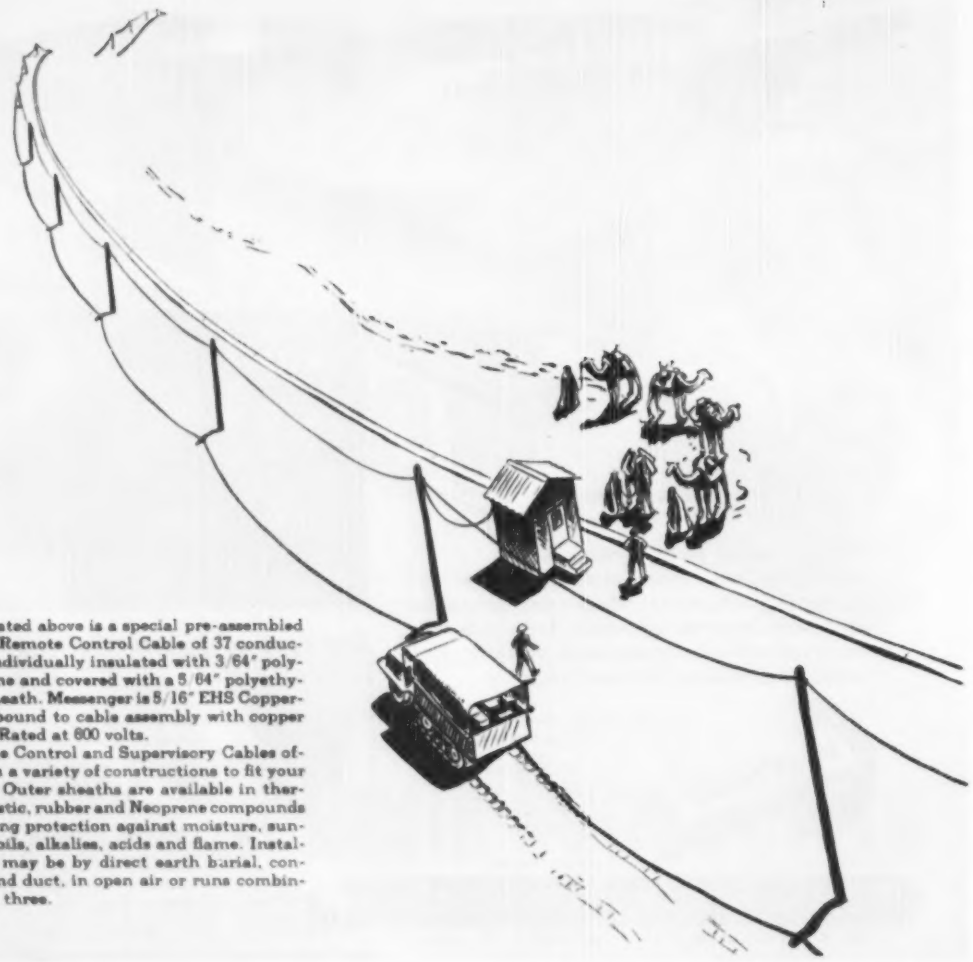
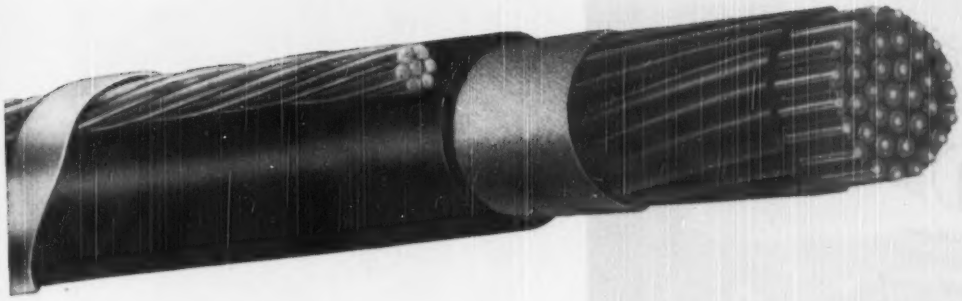
Tough Conditions for Tougher Cables



Illustrated above is a special pre-assembled Aerial Remote Control Cable of 37 conductors, individually insulated with 3/64" polyethylene and covered with a 5/64" polyethylene sheath. Messenger is 5/16" EHS Copperweld, bound to cable assembly with copper strap. Rated at 600 volts.

Rome Control and Supervisory Cables offer you a variety of constructions to fit your needs. Outer sheaths are available in thermoplastic, rubber and Neoprene compounds affording protection against moisture, sunlight, oils, alkalies, acids and flame. Installation may be by direct earth burial, conduit and duct, in open air or runs combining all three.



Rome
CONTROL CABLES

You won't find more severe operating conditions than those encountered in the deserts of the Middle East. Blistering sun and violent winds combine forces to attack anything above ground.

That's why a well-known Middle East oil company with the problem of a sensitive, long-distant, remote control operation specified Rome Control Cable for the job. Long-time stability of electrical characteristics, sensitivity of operation, resistance to extreme weather were essential. The installation involved both aerial and direct earth burial circuits, especially designed for matched performance. Selection of Rome Control Cable for such rigorous service was no accident! It resulted from Rome's ability, through competent engineering and research, to design the *right cable for the job* and manufacturing facilities to produce it.

The permanent dependability of Rome control and signal cables assures years of efficient, trouble-free service for vital control functions. Control circuit failures are eliminated. If you have a difficult control cable problem, let Rome solve it for you. The coupon below will bring you specifications and test data. Mail it today.

IT COSTS LESS TO BUY THE BEST

RoZone* Insulated Cables

RoZone is a superior oil-base ozone-resistant insulation for applications where highest quality and long service life are paramount. High electrical stability in wet locations, immunity to effects of corona and ozone, high dielectric and surge strength and low dielectric loss make Rome RoZone unexcelled for higher voltages. Manufactured with RoPrene (Neoprene) or conventional cable coverings as specified. Recommended for operating temperatures up to 75° C. Ask for Specification RO-4.

RoMarine-RoPrene* Cables

Here is the popular and economical combination of RoMarine, a super-aging and moisture-resistant insulating compound, and a RoPrene (Neoprene) sheath. A multi-purpose cable for secondary network services, industrial power distribution, service entrances and control functions. Suitable for installation aerially, in ducts, on racks or direct in earth. Available as single or multiple conductor in a wide range of sizes. Recommended for operating temperatures up to 75° C. and Underwriters approved as Type USE. Ask for Bulletin RR-1.

*T M Reg.

ROME CABLE CORP., Dept. EW-9, Rome, N. Y.
Please send copy of new Rome Power and Control Cable Catalog.

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Company .....

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ROME · NEW YORK
From Bar to Finished Wire

ROME CABLE ROME, N.Y.

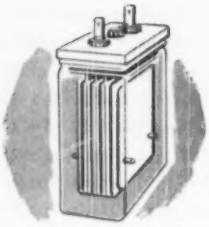
Positive plate is pure antimony-free lead of highest metallic purity and electrical efficiency.

"Here's Why GOULD PLANTÉ Lasts Practically Forever!"

Positive plate is grooved to give highest amount of active material per square inch of plate surface.

Gould Planté Batteries remain in active, continuous, full-float service for 20, 30, even 40 years because Planté positive plates contain only pure lead—not antimony. There can be no antimony carry-over to contaminate negative plates. They float at constant voltage, maintain rated capacity all their life.

GOULD PLANTÉ
The Aristocrat of Stationary Batteries!



Large acid space means fewer water additions, lower maintenance costs, minimum servicing.

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STORAGE BATTERIES
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Always Use Gould-National Automobile and Truck Batteries
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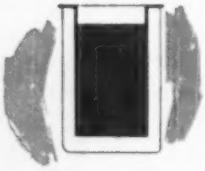
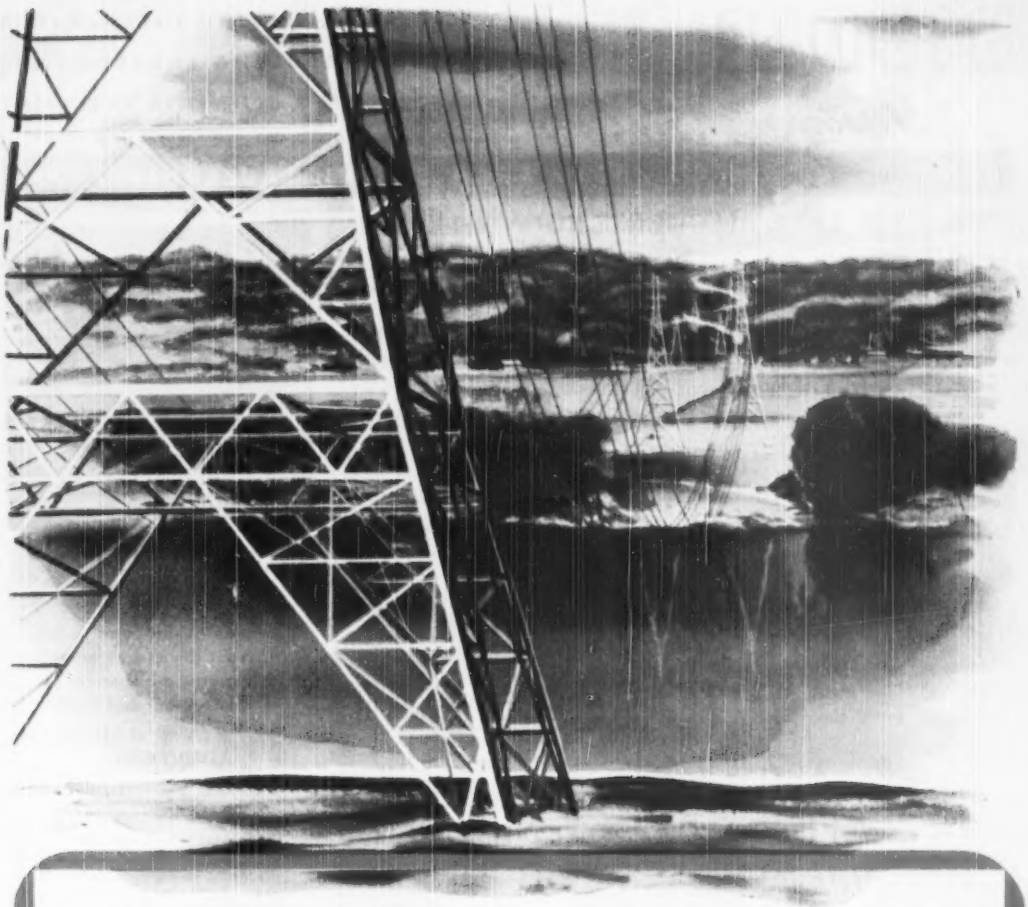


Planté is strongest of all stationary batteries. Entire cell suspended from jar. No cover sag. No cover lift.



BRIDGING THE GAP between demand and supply

When increased power demands make new lines necessary, call in Hoosier. You'll find that Hoosier engineers and trained men can most efficiently and economically work with you in bridging the gap. And Hoosier erected transmission lines have an unusually high record of uninterrupted service with a minimum of maintenance. In view of the 31 years that Hoosier has served leading utilities from coast to coast, such a record is not unusual. But it is a testimonial to the wisdom of supplementing your own organization with highly trained men and special equipment.

From actual photograph of a Hoosier erected line over the Ohio river between West Virginia and Ohio.

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NUMBER 2 OF A SERIES

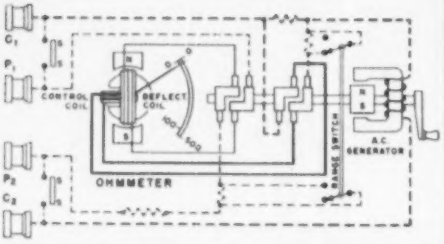
JAMES G. BIDDLE CO., 1316 ARCH ST., PHILADELPHIA 7, PA.

NEW CVM TYPE MEGGER® GROUND TESTER

...Provides Simple, Single Test Method for Measuring Resistance of Earth to Ground Connections

This modern design, strong, compact ground tester weighs only 6 pounds, measures 7½" x 5" x 5¾". An ideal, easy-to-use field instrument for determining if the resistance to earth of man-made grounds is sufficiently low to minimize dangers due to lightning.

It is a completely self-contained test set with its own generator for supplying test current—no dependence on batteries or other current supply.

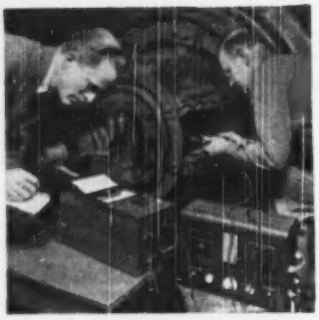


For complete details and prices on this *New* instrument, write for Bulletin 25-80-W.

A *NEW* CONSTANT-VOLTAGE TYPE MEGGER® INSULATION TESTER IN LOW-PRICED RANGE

The trim, modern design of this newcomer to the Megger family of insulation resistance testing instruments is only part of the story. Ohm scale and selector switch are available on all instruments in ranges of 0 to 10 megohms, 100 volts d-c, 0 to 20 megohms, 250 volts d-c, 0 to 50 megohms, 500 volts d-c. The constant-voltage feature is standard with all of these new CVM (Constant Voltage Type Megger) Insulation Testers. These features plus several other mechanical refinements contribute to make this instrument a worthy addition to the popular line of Megger Instruments.

Bulletin 21-80-W, describing this instrument, will be sent on request. Check the coupon below.



ELECTRICAL MAINTENANCE APPLICATIONS of LOW RESISTANCE MEASUREMENTS

Cable and Conductor Joints
Oil Circuit Breaker Assemblies
Rotating Equipment
Transformers and Coils

...QUICKLY CHECKED with DUCTER®

LOW RESISTANCE OHMMETER

High-resistance **conductor joints** and connections cause objectionable voltage drops, loss of power, and damage from localized heating. Quick and reliable measurements of joint and contact resistance during manufacture, at installation, and periodically while in service are therefore good insurance against malfunctioning and trouble.

Several of the joints and contacts throughout **oil circuit breakers,** from top-terminal of the bushings to associated bushings, may give serious trouble when unnecessary heating develops.

In **rotating equipment** shorted commutator bars, shorts in armature coils, and shorts between equalizers or cross connections, and also high resistance joints between commutator bars and risers, spell inefficient performance and trouble.

Proper winding resistances of **transformers and of coils** are as important as in any other electric circuit, with one exception—such windings have inductive characteristics, as well as d-c resistance.

Anyone familiar with these types of equipment can measure ohmic resistances down to a few millionths of an ohm with the DUCTOR® Low Resistance Ohmmeter. Valuable information on this subject is contained in our Bulletin 24-25-W.

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☐ 25-80-W ☐ 21-80-W ☐ 24-25-W

☐ Complete list of latest Bulletins.

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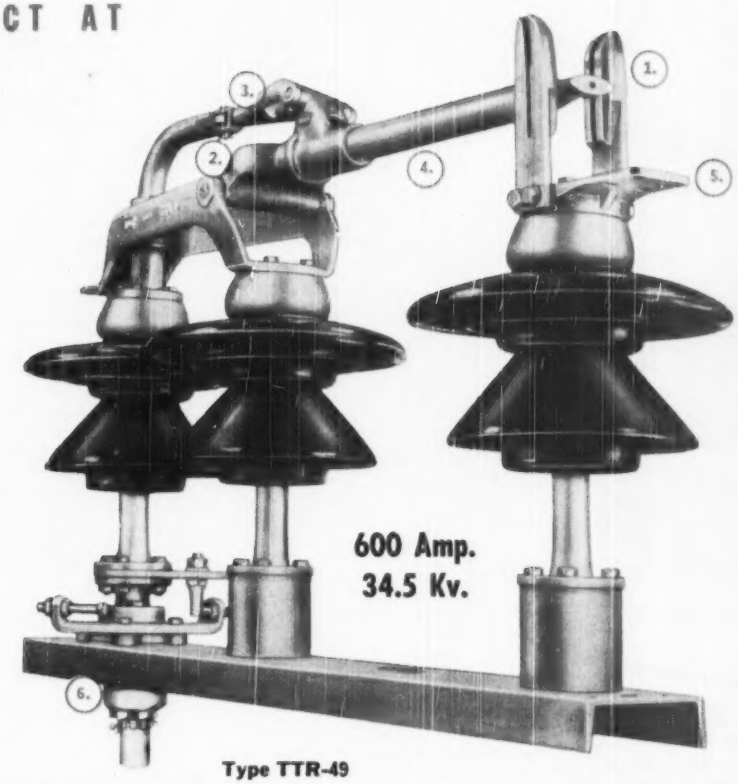
James G. Biddle Company
1316 Arch Street, Philadelphia 7, Pa.

Check the Facts on

The NEW Type TTR-49 Disconnecting Switch with Sealed Pressure Hinge Contact

NO EXPOSED CONTACT AT HINGE



Type TTR-49

1 JAW CONTACT—Hi-Pressure, Hi-Thermal capacity silver to copper contact. ONLY ONE BREAK CONTACT ON THE SWITCH. Copper and beryllium jaw—copper for thermal capacity and beryllium for strength and resilience. Here's maximum protection against fault current damage.

2 HINGE CONTACT—Completely enclosed and weather sealed Hi-Pressure, Hi-Thermal capacity, silver to copper Hinge Contact. Continuous, annular, constant electrical and mechanical contact at all times. Eliminates second break contact with its multiplied problems and maintenance.

3 BLADE OPERATING MECHANISM — Simplified and "streamlined" to attain a simple harmonic, accurately controlled blade motion. Special pin fastenings, snap rings, and rivets have been eliminated from moving parts. Universal blade balance on 69 Kv. and above.

4 BLADE—Extra heavy, hard drawn tubular copper with integral, formed contact end. Solid current path from jaw to hinge contact.

5 TERMINALS—Four half-inch bolts on 1¾ x 1¾ inch centers permit NEMA standard 600 or 1200 Ampere clamping and R & IE Type "UC" universal clamps. Both terminals equal height from base.

6 BEARING—Aluminum housed, weather sealed, stainless ball—requires no lubrication.

39 Years of Switch Progress

Built for Outstanding Performance for the Years to come

RAILWAY and INDUSTRIAL ENGINEERING CO., Greensburg, Pa.

IN CANADA—EASTERN POWER DEVICES LIMITED, TORONTO

AN I-T-E SUBSIDIARY

Again for '51

THE *PACE-SETTING IDEAS* ARE COMING FROM *CROSLEY*

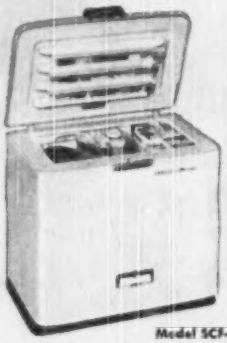
Crosley engineers dare to be different! Not content with old ideas and conventional designs, they have set a new pace that puts Crosley products years ahead of competition with dramatic new selling features that mean extra sales... satisfied customers. With Crosley, you can offer exciting new features long before they become available on other makes... features that are a direct result of close coordination between Crosley engineers and the Crosley Home Economics Department.

Model SCOO-1

CROSLEY SETS THE PACE in electric ranges with brand-new innovations in automatic cooking — it does *everything* automatically — roasts, bakes, boils, broils, fries, or *barbecues*, all by clock control!

New Corner Model Water Heater

CROSLEY SETS THE PACE in water heaters with a wide range of 42 sizes and models—including the new Corner Model and the popular Round and Table-top Models. Install anywhere. Handsome Custom and De Luxe Models supply hot water the safest way!



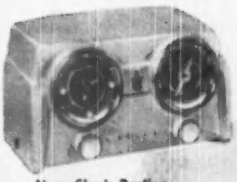
Model SCF-8

CROSLEY SETS THE PACE in home freezers with thrifty fast-freezing at 20 *degrees below zero—a marvelous new automatic ice cream freezer* that has a motor-driven paddle — and the exclusive new SHELVADOR design that almost *doubles* "top-level" storage space.

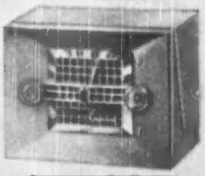
CROSLEY SETS THE PACE in complete kitchens with beautifully styled cabinets, sinks, refrigerator and range pantries, and other accessories.

1. Wall Cabinets
2. Range Pantries
3. Refrigerator Pantries
4. Utility Cabinets
5. Kitchen Radios
6. Base Cabinets
7. Electric Ranges
8. Sinks and Garbage Disposers
9. Kitchen Freezers
10. Shelvador® Refrigerators
11. Table-top Water Heaters

The pace-setting ideas are truly coming from Crosley. Build your business today with Crosley and you'll build for a more profitable tomorrow.



New Clock Radios—
Series 11-120



Decorator Radios—
Series 11-106

CROSLEY SETS THE PACE in radios, too, with a wide choice of colorful, magnificent table models, portables, and consoles . . . color-styled and tone-engineered.

Model 11-443 MU

CROSLEY SETS THE PACE with TV you can really demonstrate and sell. It's *Family Theatre Television* with *Full Room Vision!* Your customers will see how Crosley's Family Theatre screen gives them clearer, sharper, big pictures from *any* viewing angle. Inside and out, the new Crosley line for '51 has been engineered to give the finest in Big Picture TV.

Model CAC-11

CROSLEY SETS THE PACE in refrigerators with the 1951 Shelvador®. You'll be selling brand-new features—"Care-Free" Automatic Defrosting . . . "Soft-Glo" Interior Styling . . . and of course, the extra advantage of twice as much "front-row" space.

FOR FULL DETAILS, write for the address of your nearest Crosley Distributor:

Crosley Division
Avco Manufacturing Corporation
1329 Arlington Street
Cincinnati 25, Ohio

AVCO

CROSLEY
Better Products for Happier Living

Cut costs drastically

Kaiser Aluminum Weather Proof Wire saves you money! First costs are lower! Its light weight saves on installation costs! Operating costs are not affected! Lasts longer, reducing replacement costs.

That adds up to cold cash savings no utility or bidding contractor can afford to overlook!

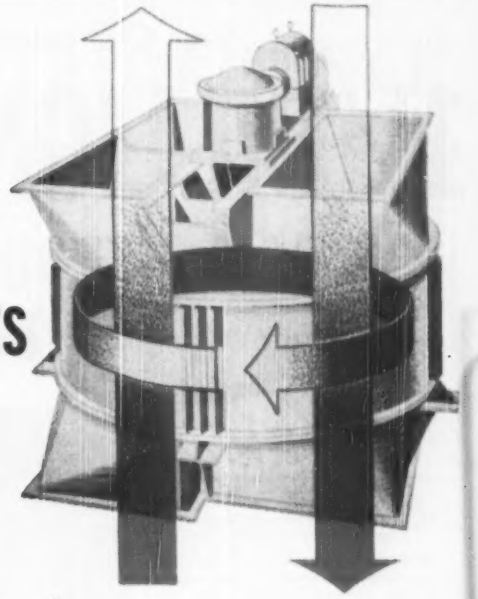
On your next job, specify Kaiser Aluminum Weather Proof Wire—available in a wide range of sizes, neoprene or polyethelene covered. Deliveries from Kaiser Aluminum's conveniently located Newark, Ohio, plant are prompt, dependable. Phone, wire or write any office listed below for complete information.

Kaiser Aluminum

WEATHER PROOF WIRE

SOLD BY KAISER ALUMINUM & CHEMICAL SALES, INC., KAISER BUILDING, OAKLAND 12, CALIF. . . . OFFICES IN:
Atlanta • Boston • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Houston • Indianapolis • Kansas City • Los Angeles
Milwaukee • Minneapolis • New York • Oakland • Philadelphia • Portland, Ore. • Rochester, N. Y. • Seattle • Spokane • St. Louis
Wichita • EXPORT OFFICE, OAKLAND, CALIFORNIA • WAREHOUSE DISTRIBUTORS IN PRINCIPAL CITIES

How the Ljungstrom Air Preheater can modernize "middle age" boilers



The lightness and compactness of the Ljungstrom Air Preheater makes installation possible on "middle age" boilers with minimum change in the existing structure. This addition of the Ljungstrom Air Preheater, with its continuous regenerative counterflow principle permits operation at lower exit gas temperatures . . . assuring increased heat recovery and reducing the amount of fuel required.

In a matter of a few years the Ljungstrom Air Preheater will effect savings that will more than offset the initial installation cost. If you are interested in approaching modern performance standards with your "middle age" boilers, our engineers will welcome the opportunity to show you how the Ljungstrom can raise the overall efficiency of your plant.

The Ljungstrom operates on the continuous regenerative counterflow principle. The heat transfer surfaces in the rotor act as heat accumulators. As the rotor revolves the heat is transferred from the waste gases to the incoming cold air.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

CORNELL-DUBILIER CAPACITORS
FOR POWER-FACTOR IMPROVEMENT

these C-D capacitors have given over

1⅓ BILLION KVAR HRS.
OF 99.5% TROUBLE-FREE SERVICE
on the Bonneville Power Administration System

Here's why:

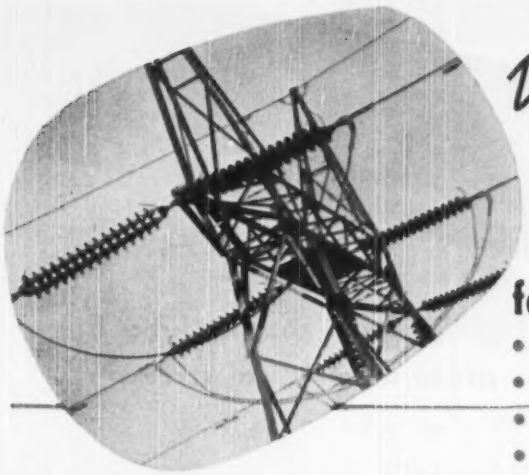
- **Lowest dielectric unit stress and highest major insulation level.**
- **Bushing cavity Dykanol filled and completely insulated from capacitor cavity. Increases the accepted flash-over safety factor.**
- **Wide margin maintained between paper and foil coordinated with major insulation to provide highest impulse level.**
- **Submersion in special non-inflammable and non-explosive Dykanol impregnant, results in high stability and long life.**
- **C-D design results in the lowest volt-amperes per square inch of radiating surface.**

To supply the vast amount of power required by the growing aluminum industry in the Northwest, Bonneville Power Administration has made increasing use of power-factor capacitors. Bonneville reports that its C-D capacitors have so far delivered 1,316,803,200 Kvar./hrs. of 99.5% trouble-free service — an unmatched field performance record!

C-D 18,790 Kvar substation, part of 20,160 Kvar purchased for Longview in 1942. Satisfied with the unmatched trouble-free performance of this installation, Bonneville has since ordered additional C-D capacitors totaling over 100,000 Kvar.

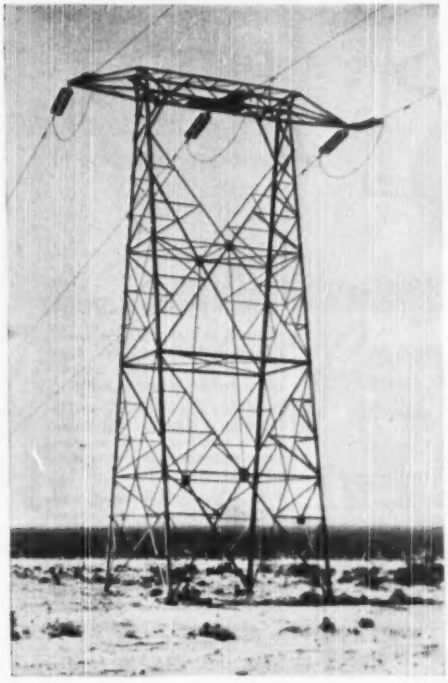
CORNELL-DUBILIER
CAPACITORS
BEST BY FIELD TEST

*Write for catalog, **Cornell-Dubilier Electric Corp.**, South Plainfield, N. J.*
Other Plants: New Bedford, Worcester, Brookline, Mass.; Providence, R. I.; Indianapolis, Ind.; Cleveland, O.



Demand PROOF OF PERFORMANCE

for Superior Insulator Quality



All insulators are not alike. That is why Thomas welcomes competitive tests. For example . . . in 1938, a large western 230-kv line was under construction. Insulator manufacturers were invited to send samples of their 10-inch suspension insulators for competitive tests.

RESULT: The whole job . . . 50,000 suspension units . . . was awarded to The R. Thomas and Sons Co. That the Customer's choice was right is evidenced by the following telegram received recently:

"Approximately 37,000 Thomas ten-inch suspension insulators were installed on our 230-kv lines in 1938. Balance of 13,000 units used for general construction purposes at different voltages. Have given entirely satisfactory performance."

After all is said . . . it's still quality that counts plus proper designing, precision manufacturing . . . and PROOF OF PERFORMANCE. Since the beginning of the Electrical Industry, Thomas has been supplying porcelain for the most difficult insulation problems. Why gamble?

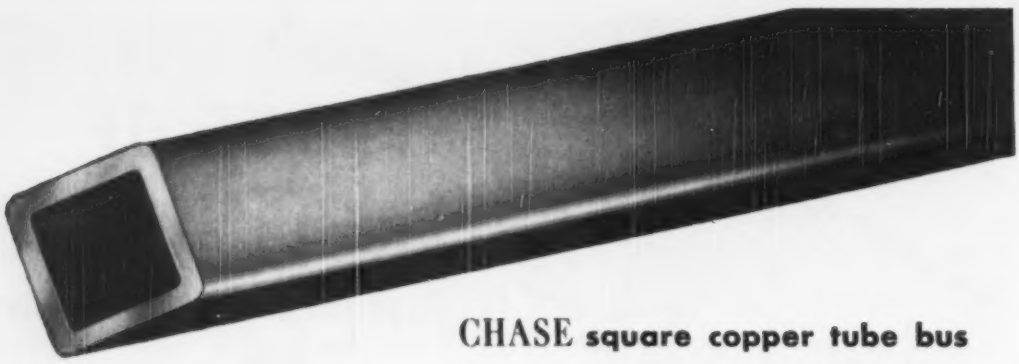
SPECIFY THOMAS INSULATORS—THE BEST BY LINE TEST SINCE 1873

The R. Thomas and Sons Co.

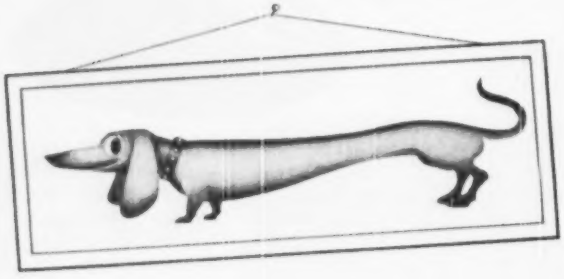
LISBON, OHIO

NEW YORK CHICAGO

Sales Representatives: Paul Berry, *Oklahoma City* • Ken H. Best, *Seattle* • Butler & Land, *Dallas* • John A. Clark Electric Co., *Minneapolis* • R. E. Cunningham & Son, *Los Angeles* • Electric Supply Co., *Albuquerque* • Engineer Sales Corp., *St. Petersburg* • R. F. Hamilton & Associates, *Denver* • Geo. E. Honn Co., *San Francisco* • Leiser & Co., *Philadelphia* • Lynn Elliott Co., *Houston* • John G. Pattyjohn Co., *Knoxville* • Redmond Supply Co., *Phoenix* • J. F. Schaefer & Co., *Kansas City* • R. J. Sullivan & Co., *Boston* • Triangle Electric Supply Co., *El Paso* • Joe Williams, *Little Rock* • *Representatives in other principal cities.*



CHASE square copper tube bus has great mechanical strength...



ALLOWS longer spans between supports

SAVINGS in time and cost of installation are often possible if Chase Square Copper Tube Bus Conductors are used. The square construction gives maximum mechanical strength *in all directions*.

High structural strength permits longer spans between supports. Ease of assembly and erection add to the saving in time and money. Since these square copper tubes have four flat sides, adequate and uniform pressure can be exerted between the large contact surfaces, resulting in firm, secure joints. They may be joined by clamping, bolting, or brazing.

That's why we say Chase Square Copper Bus Tubes are the finest you can use. Write for full specifications and details. Address inquiries to Department EW 950.

LOOK AT THESE ADVANTAGES

- Made of high electrical conductivity copper resulting in high thermal conductivity, low voltage drop and power loss per pound of metal.
- Square construction provides maximum structural strength; essential in withstanding the very large forces caused by heavy short circuit currents.
- Four flat sides allow adequate and uniform pressure to be exerted between the large contact surfaces, resulting in firm, secure joints.
- Square, one piece construction enables you to assemble conductors, fittings and supports without difficulty.
- Copper is well known for its excellent resistance to corrosion.

Chase

the Nation's Headquarters for
BRASS & COPPER

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SUBSIDIARY OF KENNECOTT COPPER CORPORATION

THIS IS THE CHASE NETWORK ... handiest way to buy brass

ALBANY† ATLANTA BALTIMORE BOSTON CHICAGO CINCINNATI CLEVELAND DALLAS DENVER† DETROIT HOUSTON† INDIANAPOLIS KANSAS CITY, MO. LOS ANGELES MILWAUKEE MINNEAPOLIS NEWARK NEW ORLEANS NEW YORK PHILADELPHIA PITTSBURGH PROVIDENCE ROCHESTER† ST LOUIS SAN FRANCISCO SEATTLE WATERBURY †Sales Offices Only

The Perfect Combination . . .

WESTERN RED CEDAR POLES

LIFE-SPAN full length Immunization

Here truly is an unbeatable combination . . . Nature's most perfect poles treated the LIFE-SPAN way. Every Western Red Cedar Pole receives complete end-to-end treatment, first in a hot solution to drive out the air and prepare the wood cells for preservative absorption; next a sudden submersion under a cold pentachlorophenol solution which contracts the expanded air in the cells. This creates a vacuum sufficient to pull the solution deep into the sapwood. Pole protection is sealed for life, insuring dependable service up to pole line obsolescence.

Linemen like LIFE-SPAN poles because they are clean, easy to handle, and safe to work on. Utility companies like them because they offer dependable service and they build good public relations for the companies using them.

To be sure, to be doubly safe . . . specify LIFE-SPAN Western Red Cedar Poles.

The same LIFE-SPAN treatment is also available for Fir, Western Larch and Lodgepole Pine.

CONSOLIDATED TREATING CO.
MINNEAPOLIS, MINNESOTA

For further information write any of the following:

NAUGLE POLE & TIE CORP.
Chicago, Illinois

PAGE & HILL, INC.
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B. J. CARNEY & CO.
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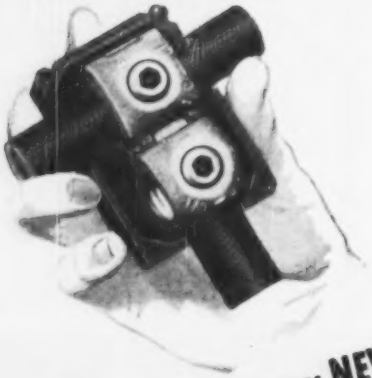
Sandpoint, Idaho
Suppliers for Joslyn Mfg. & Supply Co.

simple...



THE REVOLUTIONARY NEW O.Z. KWI-COVER

it's tops for fast, easy installation...

Type XTPC | Type XWC | Type PTC | Type PMC

BETTER PROTECTION

Here's the simplest, fastest-to-install cover you ever saw or used. This two-piece, molded canvas-bakelite cover entirely eliminates tedious taping. You simply put the KWI-COVER over the tap,—snap the fasteners — and that's all there is to it. The four sturdy stainless steel spring fasteners center automatically; lock out dirt and prevent damage.

Loose parts have been eliminated. Snaps are an integral part of the cover body — can't get lost, can't fall off. And sturdy! KWI-COVER is super-strong, has high impact strength — can really stand up under abuse.

O. Z. KWI-COVERS for tee, parallel or two way taps are available from stock. Write today for detailed information on the simplest, strongest tap cover of them all.

O.Z. ELECTRICAL MANUFACTURING COMPANY, INC.
145 BOND STREET BROOKLYN 2, N. Y.

And Remember — They're O. K. If They're O. Z.

CONDUIT FITTINGS · CABLE TERMINATORS · CAST IRON BOXES · GROUNDING DEVICES · SOLDERLESS CONNECTORS · POWER CONNECTORS

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HERE IT IS!

A New, Improved, Better Handling

CRESCENT ROUND NOSE LINEMAN'S PLIER

Grasped by any experienced hands, this new Crescent Round Nose Plier immediately impresses the user with its feel and balance. The rounded nose enables it to be used in places where the conventional type will not reach... lets it slip easily in and out of loops on tool belts.

The new #2150 is lighter and thinner than the conventional pattern... actually two ounces lighter but with the same characteristics of strength and toughness that feature other CRESTOLOY pliers. Its cutting edges are carefully hand-honed to give them lasting sharpness. The milled teeth in the nose take a sure, non-slip hold on the wire or other work. The handles, while smooth to the touch, are not slippery. Head is polished, handles are black. Each plier carries the CRESTOLOY tag.

No. 2150—8"
Also available with insulated handles.

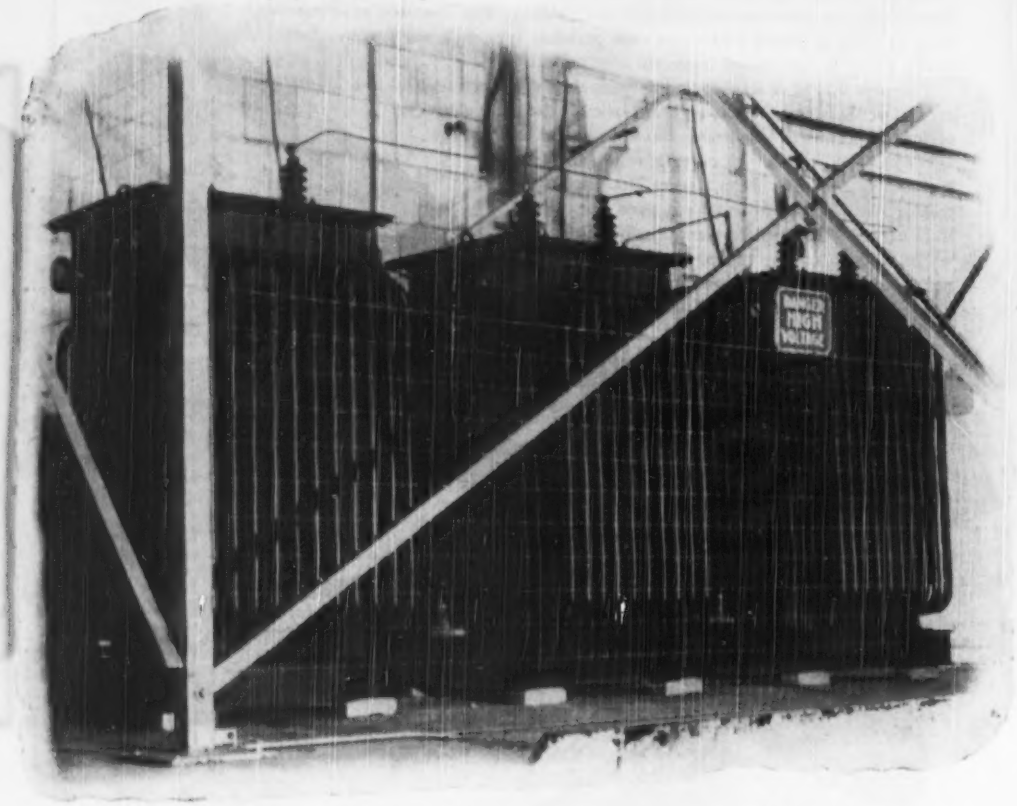
LIGHTER
Thinner, stronger than conventional pliers
STREAMLINED
Easy to get in or out of tight spots and tool belts
NON-SLIP
Handles smooth to touch but not slippery to hold
This Plier is made of CRESTOLOY STEEL and has tested 100% satisfactory
CRESTOLOY TAG
is your best guarantee of individually tested quality
HAND-HONED
cutters for lasting sharpness
MILLED TEETH
in the nose mean a firm grip on the work
CRESCENT TOOLS
Sign of the Artisan
Symbol of Excellence

"Crescent" is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

MORE POWER WITH

LARKIN TRANSFORMERS



A BANK OF 333 KVA LARKIN DISTRIBUTION TRANSFORMERS SERVING A LARGE INDUSTRIAL INSTALLATION

MANUFACTURED BY

LARKIN LECTRO PRODUCTS CORPORATION

PINE BLUFF • ARKANSAS

Sales Offices in Principal Cities

Johnny-on-the-spot

when you're on the spot!

For trouble-shooting, day-to-day maintenance, or construction assignments, there's an International Truck that's *right* for *every* utility job. You're sure of the *right* truck when you pick from the International Truck line—87 basic models, thousands of special variations, ranging from 4,200 to 90,000 pounds GVW.

Every new International Truck, from the smallest to the largest, is heavy-duty engineered for long truck life on tough truck jobs. That's the same extra value engineering that has kept Internationals first in the sale of heavy-duty trucks for 18 straight years . . . that's *extra value* that pays off in longer truck life, lower operating and maintenance costs.

New comfort in the new Comfo-Vision Cab

Here is the *driver's dream,* model for model, the "roomiest cab on the road." It has a new kind of comfort in easy-riding cushions, fully adjustable seats, controlled ventilation. The one-piece, scientifically curved Sweepsight windshield provides *outdoor* visibility.

The entire steering system is all-new—engineered for more positive control from a more comfortable position. Shorter wheelbase and wider treads provide the shortest practical turning circle—super-maneuverability in the tightest spots.

No matter what kinds of roads or loads, climate or conditions your trucks must meet, there's a new International that has been proved right for your job *under actual operating conditions.*

Find out all about that truck from your nearest International Truck Dealer or Branch, *soon.*

International Harvester Builds
McCormick Farm Equipment and Farmall Tractors
Motor Trucks . . . Industrial Power
Refrigerators and Freezers

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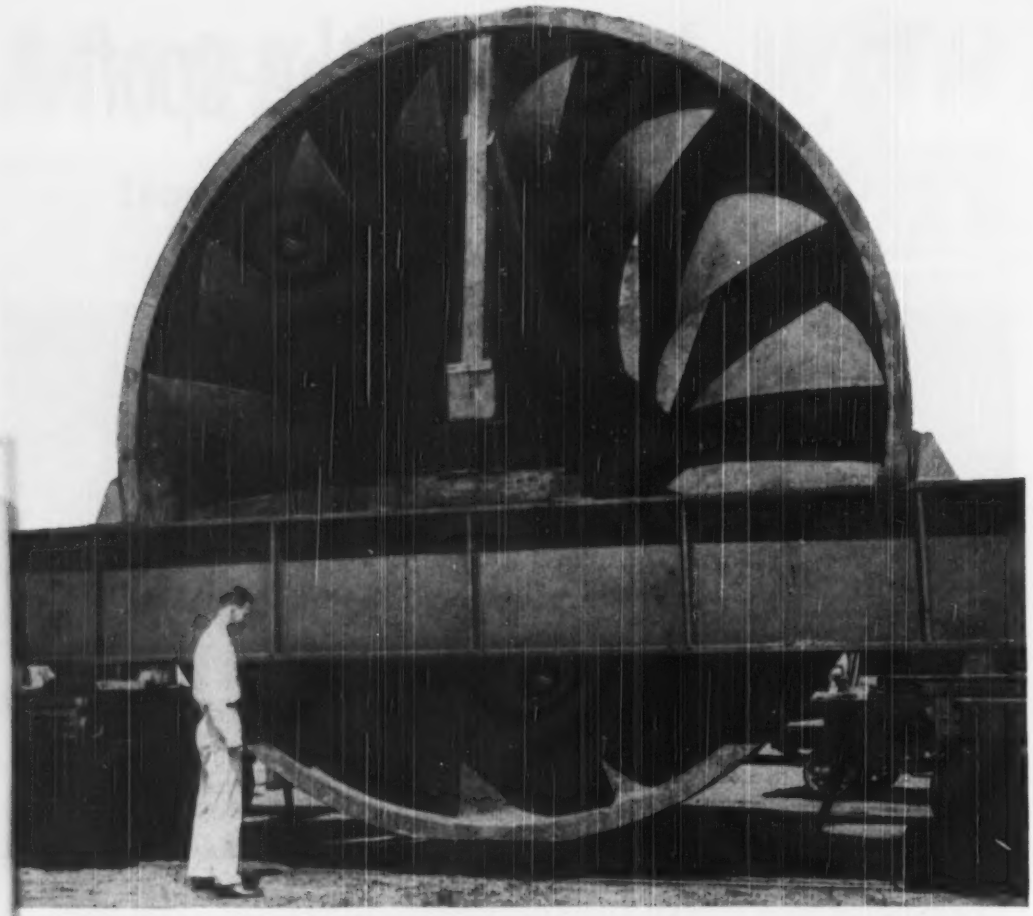
All new, all proved – Heavy-Duty Engineered to save you money

INTERNATIONAL TRUCKS

INTERNATIONAL HARVESTER COMPANY CHICAGO



FACILITIES FOR THE SMALLEST OR THE LARGEST

The 225-acre Newport News plant includes plate steel and machine shops equipped with a complete variety of tools to fabricate items of water power equipment of any size. Contracts received by Newport News for hydraulic turbines with an aggregate rated output in excess of 7,000,000 horsepower have included units as high as 165,000 horsepower and as low as 500 horsepower.

Supplementing the extensive facilities are the equally important experienced and skilled personnel at Newport News to design and build such equipment.

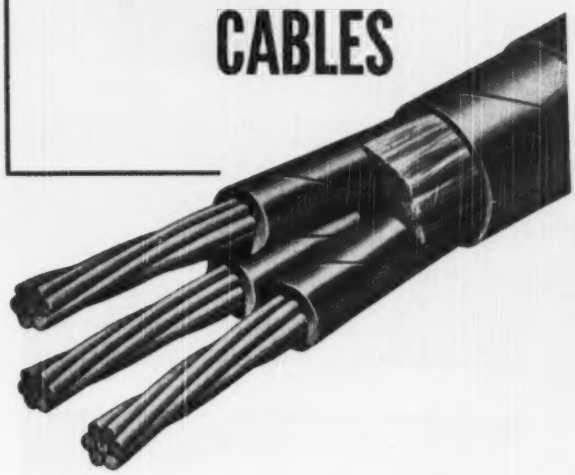
Your inquiries for hydraulic turbines of any size will receive prompt attention.

Write for illustrated booklet on water power equipment.

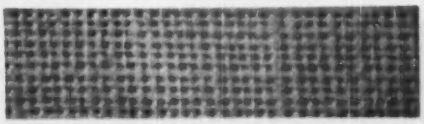
NEWPORT NEWS
SHIPBUILDING AND DRY DOCK CO.
NEWPORT NEWS, VIRGINIA

"No. 1799" means high quality

General Electric VARNISHED-CAMBRIC CABLES



1. Special untreated cotton cloth utilized in the manufacture of G-E No. 1799 varnished-cambric insulation.



2. Enlarged section of cloth. The large holes enable the cloth to absorb the maximum amount of varnish.

3. Finished varnished-cambric tape completely impregnated with varnish, provides a high degree of insulation.

That's right, when you specify General Electric cables with the famous G-E No. 1799 varnished-cambric insulation, *you know you get high quality* in every foot—*uniformity* in the thickness and strength of the insulating wall . . . high dielectric strength . . . excellent resistance to high operating temperatures.

Three factors—resulting from nearly 50 years of General Electric research and development—are primarily responsible for the excellent electrical qualities of G-E No. 1799 varnished-cambric insulation. First, a special cotton cloth, which the varnish penetrates easily and saturates thoroughly. Second, General Electric's own tough, yet flexible, varnish. Third, the careful baking processes used in the application of varnish to cloth.

The ability of varnished-cambric cable to withstand high conductor temperatures continuously can be judged by its being able to remain pliable when subjected to extreme temperatures over long periods of time. The performance of G-E No. 1799 varnished-cambric insulation under rigorous conditions proves that many years of uninterrupted service can be realized from this type of cable construction.

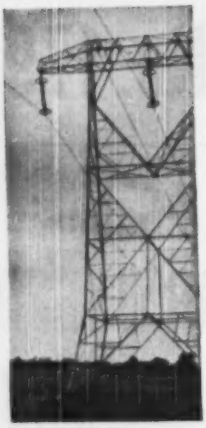
G-E varnished-cambric cables are available in 3 basic types:

BRAIDED—for power and control circuits, exposed or installed in conduit in dry locations; and for transformer and apparatus power leads. **INTERLOCKED-ARMOR**—for overhead distribution in power plants, factories, and the like. This cable requires no raceways, permits speedy installations. **LEADED**—for generator leads and power wiring overhead or in underground ducts. Ideal for heavy loads in wet or dry locations.

For information on the complete line of General Electric varnished-cambric insulated cables, contact your local G-E Construction Materials distributor or district office. Section W4-927 Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.

GENERAL ELECTRIC

Panorama OF PROGRESS

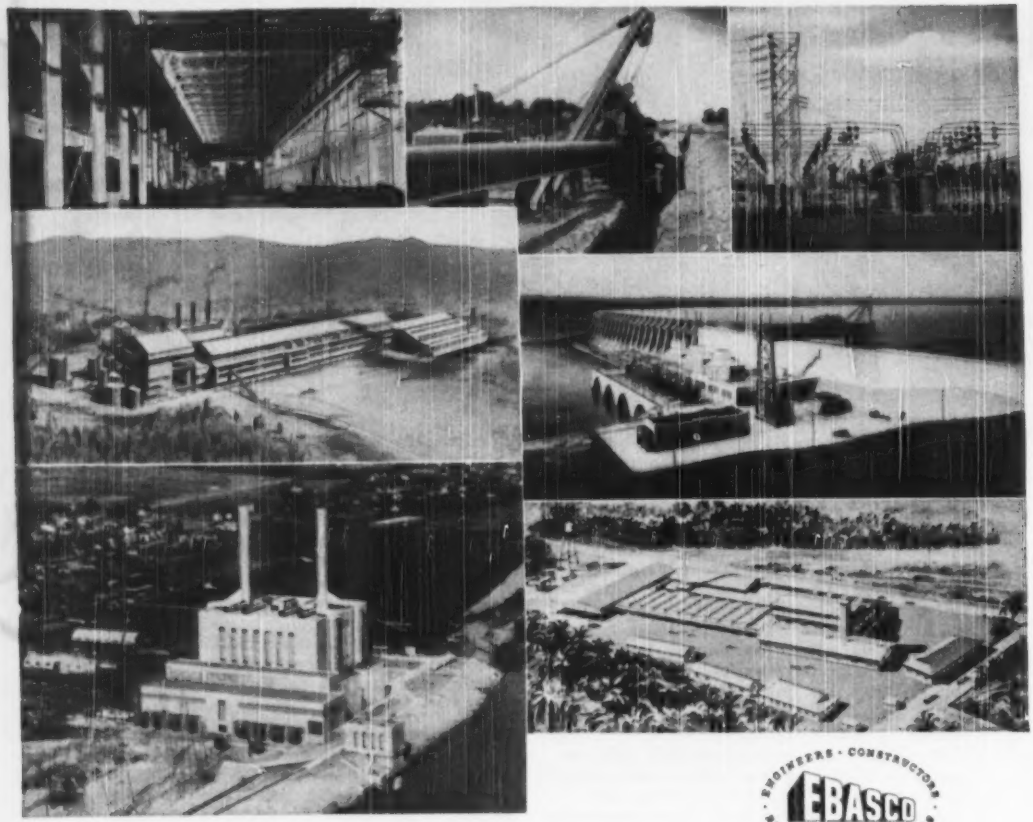


A few examples of EBASCO's extensive, world-wide engineering and construction activities are pictured here. Industrial plants—steam electric stations—hydro electric projects—natural gas pipelines—each built quickly and efficiently with the aid of competent EBASCO teamwork.

Here is progress—the American way! These projects are a tribute to the initiative of business management in providing the modern facilities that give America the world's highest standard of living.

Now and for the future, wherever the need for such progress arises, EBASCO stands ready to do the job.

Send for the booklet *"The Inside Story of Outside Help."*
Address Ebasco Services Inc., Dept. M, Two Rector St., New York, N. Y.



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Budget	Financial	Office Modernization	Sales & Marketing
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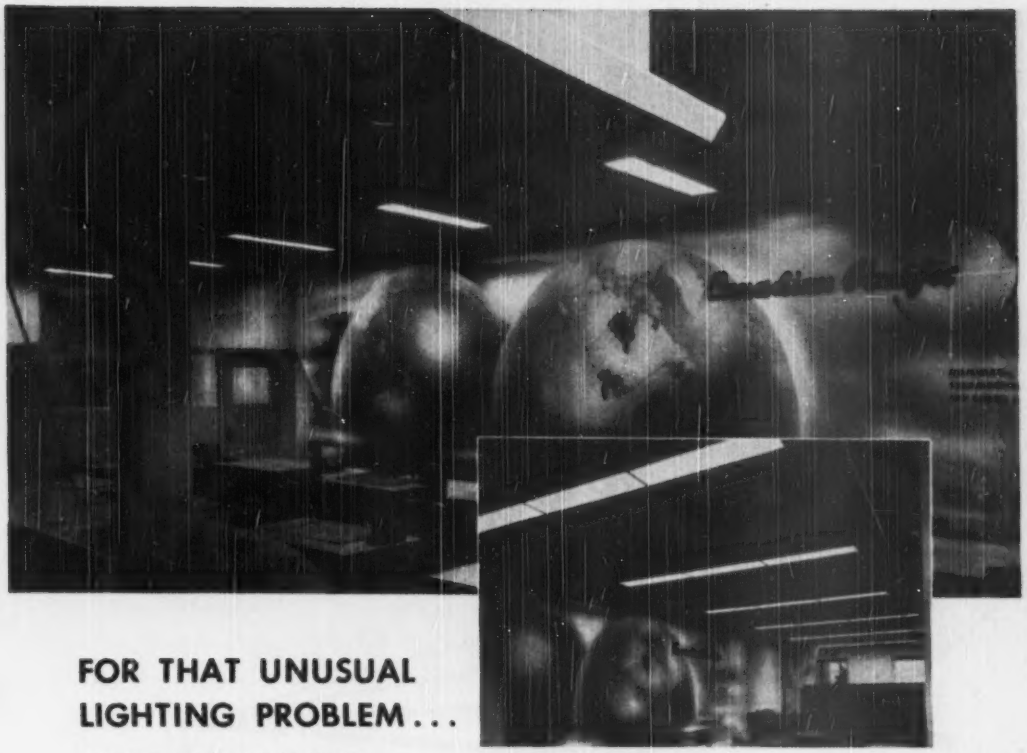
			Traffic



FOR THAT UNUSUAL LIGHTING PROBLEM . . .

CORNING FOTA-LITE

Canadian Pacific Railway Co. Office, New York, N. Y.
Architect: Rogers and Butler, New York, N. Y.
Fixture Manufacturer: Frink Corporation, Long Island City, N. Y.
Consulting Engineer: Gustave B. Weiser, New York, N. Y.
Glass: Corning FOTA-LITE

The distinctive three-dimensional effect of the mural in the New York office of the Canadian Pacific Railway didn't just happen. It is the result of well executed art and carefully planned lighting. Through judicious use of Corning FOTA-LITE the mural's highlights and shadows are properly emphasized by eliminating distracting glare.

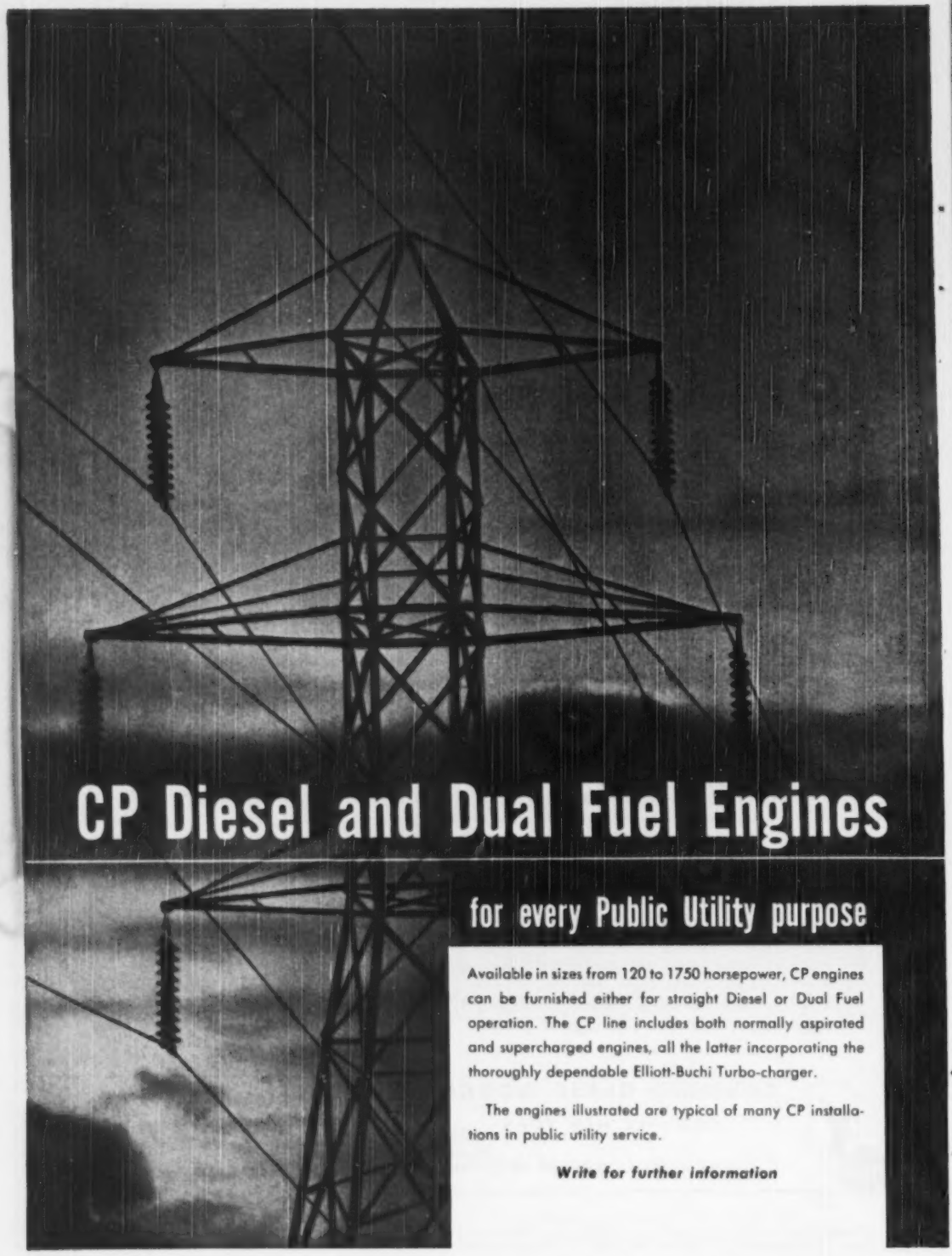
The unique pattern of FOTA-LITE permits virtually unrestricted light transmission downward through crystal glass. The opal louvers which are integral with glass intercept and diffuse light which would cause high angle brightness. Non-color selective, FOTA-LITE transmits the true color of the light source . . . gives better quality light.

FOTA-LITE combines the advantages of louver lighting with those of diffusing glasses. The louver effect is contained within its 3/8" thickness, thus reducing bulk. The glass will not fade, warp or scratch. The smooth surface does not attract dust and is easily cleaned. FOTA-LITE is available in widths up to 23" and in lengths up to 49". For more complete information regarding this unusual glass, write to-day.

CORNING GLASS WORKS
CORNING, NEW YORK
Corning means research in Glass

FOR EFFICIENT, ATTRACTIVE LIGHTING . . .
CORNING ALBA-LITE for diffusion of fluorescent light . . . CORNING FOTA-LITE for high level illumination . . . CORNING brand LENS PANELS and PYREX brand LENSLITES for prismatic light control

CORNING GLASS WORKS
Dept. EW-9, Corning, N. Y.
Please send me more information about Fota-Lite glass.
Name _____ Title _____
Firm _____
Address _____
City _____ Zone _____ State _____



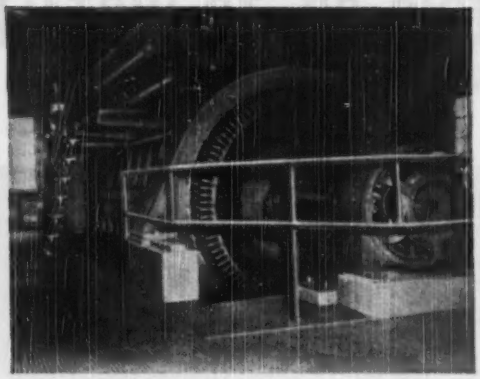
CP Diesel and Dual Fuel Engines

for every Public Utility purpose

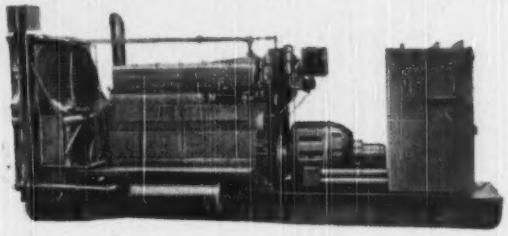
Available in sizes from 120 to 1750 horsepower, CP engines can be furnished either for straight Diesel or Dual Fuel operation. The CP line includes both normally aspirated and supercharged engines, all the latter incorporating the thoroughly dependable Elliott-Buchi Turbo-charger.

The engines illustrated are typical of many CP installations in public utility service.

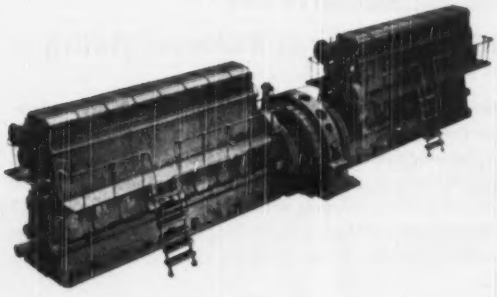
Write for further information



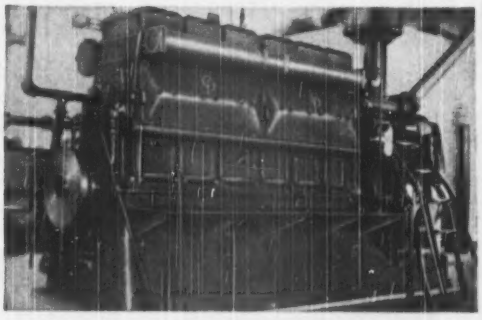
1650-hp Dual Fuel Generator unit in public utility plant – 327 rpm, 1150 kw.



500-kw CP Portable Generator unit for public utility emergency service.



Twin Engine Generator unit rated 2250 hp, 1500 kw.



A 175-kw Diesel Electric unit in a prominent utility plant, with more than 14,000 hours service to date.

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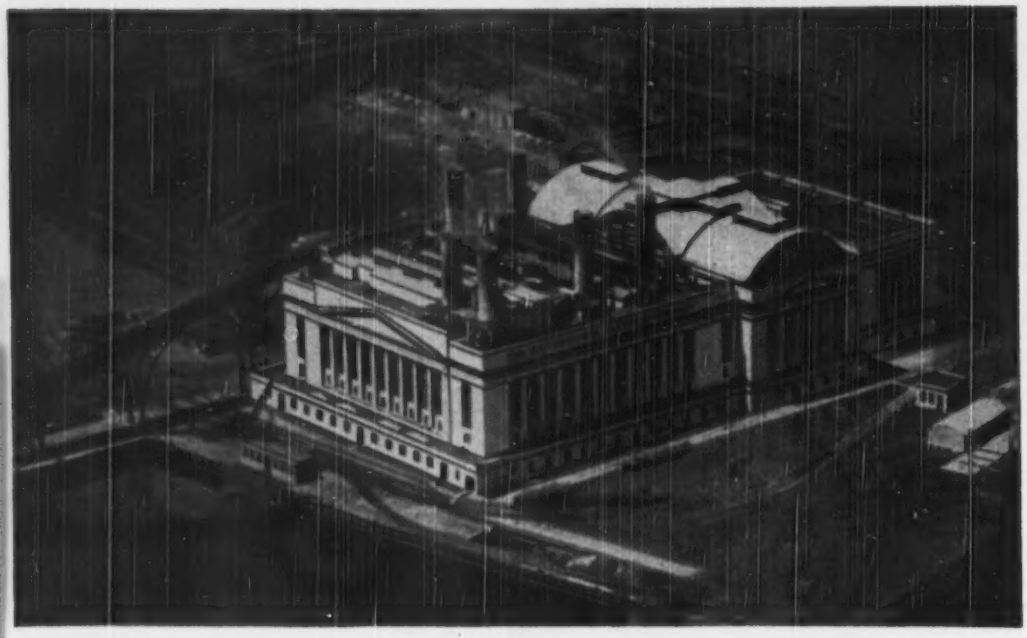
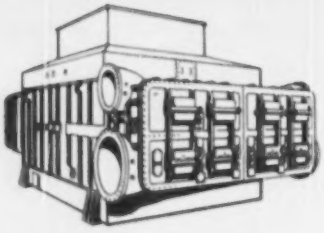
PHILADELPHIA ELECTRIC CO. TO INSTALL 75,000 SQ FT CONDENSER





Ingersoll-Rand rectangular condensers are saving space and construction costs in many new generating units and those now under construction.

Other I-R power-plant equipment serving the Richmond Station includes: Pumps for Boiler Feed, condensate, circulating water and house service . . . Compressors for plant and instrument air.

I-R Condenser will serve new 165,000 kw generator at Richmond Station

The Richmond Station of the Philadelphia Electric Co. serves fast-growing Northeastern Philadelphia. Industrial expansion in this area plus careful planning for future needs has resulted in the addition of this new 165,000 kw generating unit. An Ingersoll-Rand 75,000 sq ft single-pass Rectangular Condenser with two I-R 70,000 gpm vertical circulating water pumps will serve the 1800 rpm, 13,800 volt tandem-compound turbo-generator. Steam operating conditions will be 1250 psig, 950° F.

Here, as in many other central stations, Ingersoll-Rand equipment has given power-plant operators the benefit of the very latest developments in condenser, pump and compressor design. If you are expanding your facilities, be sure and get full information on Ingersoll-Rand equipment.

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NOCRETE WITHOUT CONCRETE ENCASEMENT

ORANGEBURG Fibre Conduit News

STANDARD WITH CONCRETE ENCASEMENT

VOL. 1 NO. 4 — JUNE 1950

CONTRACTORS AGREE—THIS CONDUIT LAYS FASTEST AND AT LOWEST COST!

From the minute the first length is loaded on the truck till the final length is laid in the trench, ORANGEBURG CONDUIT saves time, work and money for the contractor. And once laid, this high quality conduit provides a safe, permanent underground cable raceway.

STANDARD is Profitable

For banks of three or more ducts, remember that ORANGEBURG STANDARD is the first choice of leading utilities, municipalities, industries, contractors and design engineers all over America. This nationwide approval is due to Orangeburg's quality and dependability and its *profitable ease of installation.*

NOCRETE is Profitable

For the many single or double duct runs where it is practical to install *without* concrete encasement, use ORANGEBURG NOCRETE. NOCRETE is specifically designed with extra heavy wall for direct burial *without* concrete encasement. It is used with profit for installing the underground electrical services of . . . factories, schools, colleges, hospitals, drive-in theatres, power, telephone and other communications systems . . . also service entrances, parkway and suburban lighting, airport lighting and communication.

LOW COST FAST INSTALLATIONS

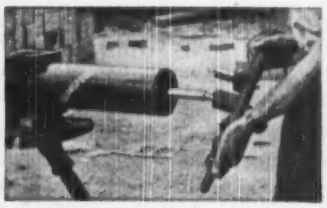
Orangeburg Conduit is easy and economical to lay. Moreover, it gives permanent protection to cables. Its impermeable wall keeps out corrosive ground waters—resists acids, alkalis, salt, grease and oil. Orangeburg Conduit is tough, resilient—no cracking or breaking when properly handled.

NOW BRANDED WITH **ORANGEBURG** TRADEMARK

FASTER, CHEAPER HAULAGE

By combining light weight with ample strength to resist breakage, Orangeburg Conduit can be hauled in capacity truck loads without damage and with fewer trips between distribution point and location. Result—transportation costs cut to minimum and job gets started faster.

EASY TOOLING ON JOB MAKES JOB MORE PROFITABLE



Orangeburg is easily tooled on the job. It can be sawed readily to any length. It lightens work for the crew—increases the contractor's savings and net profits.

TAPERSLEEVE JOINTS SAVE TIME AND MONEY

Assembly with Tapered Sleeve Joints is surprisingly simple and fast. You merely place coupling on conduit taper and a few light taps drive it home. You get a permanently watertight joint and save money making it.

Light Weight Holds Down Handling Costs

With *Standard* 4" weighing only 2 pounds and *heavier-walled Nocrete* but 3.6 pounds per foot, Orangeburg handles fast both above ground and in the trench—all at important cost savings.

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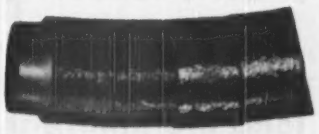

Illustrated folder—showing various types of Orangeburg Bend Sections and Angle Couplings—sent FREE on request. Write today to Dept. EW-5, Orangeburg Manufacturing Co., Inc., Orangeburg, N. Y.

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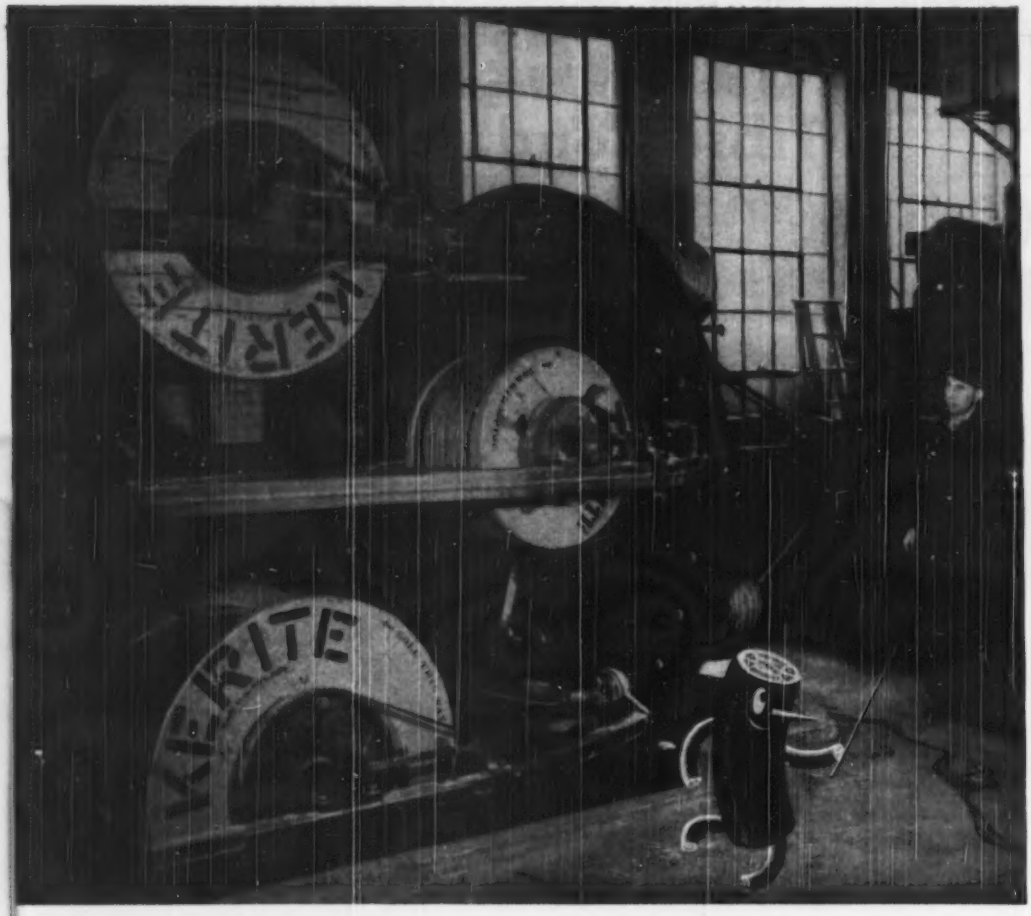

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Setting Our Sights

PREDICTIONS for electrical industry growth in the next few years are even beyond the view of the crystal gazer. In fact, we will probably look back upon this period with wonderment.

In this issue of ELECTRICAL WORLD we are presenting a forecast for the electrical industry for the remainder of 1950 and for 1951. We have presented estimates of the basic economic atmosphere and the effects that each element will probably have upon the utilities. But one or two years from now is history insofar as system planning is concerned. Orders have been placed for most major equipment through 1951, and plans are in progress for the years ahead. As it looks from early September, electric output for 1950 will total 13% above 1949, and 1951 11% above 1950. To provide for this two-year growth the entire electric industry, both private and public, will add 13 million kw of generating capacity with a corresponding amount of system facilities. It will spend in the neighborhood of $6 billion for capital additions. A total of $5 billion will be spent by investor-owned companies and municipals. Construction by PUD's, co-ops, and federal agencies will take the remainder.

With this kind of picture ahead for 1950 and 1951, where will the industry be in 1952 and 1953? With only normal growth in these years the use of electricity predicted for 1955 three months ago will have been reached in 1953. By the end of 1953, the total output would be 420 billion kwhr. Capacity would then stand at around 88.5 million kw, and the industry would be adding generators at the rate of 6 million kw per year to hold a minimum of a 15% reserve margin. With the further inflation of the dollar that may develop, annual expenditures could be well above those now being experienced. Even if the deflation, which some have long expected, should set in, the mark could be reached before expansion is curtailed. Little can be found in the future picture to indicate lesser goals.

A few months ago the McGraw-Hill Department of Economics was predicting a gross national product of $260 billion for 1950. Now this has been raised to a year-end rate of between $275 and $285 billion for all business transacted. Under normal growth and current price levels, this could be expected to rise to $335 billion by 1965. But under the conditions that may exist, we can conceivably reach Leon Keyserling's suggested goal of $350 billion by 1955. Should this growth in the economy take place, it would call for another substantial spurt in the use of electricity.

Today the industry must readjust its thinking to these potential new conditions. The planners must set their sights for things undreamed of. The electrical industry has a responsibility to prepare to serve all future electric customers and to supply all the energy they may need. We believe it can and will meet the challenge, no matter how great.

Stockholders Like It

THE JUDGES for the Reddy Kilowatt Annual Report Contest commended many companies for "inclusion of a frank discussion of the industry's problems, both financial and social." A periodic management statement of political and economic views to stockholders is not in general use throughout the electrical industry. But the idea seems to have taken hold in many quarters. We believe that this is a good practice and should be adopted throughout the industry.

There will be some in the management group who will fight such an idea. Their objection may be based on claims that the stockholders will resent such activity on the part of their company officers. Others may feel that they are not reaching the grass roots through this medium. But these questions can be answered by a questionnaire to the stockholders.

The W. A. Sheaffer Pen Co has shown the way by a survey. In his annual report, President Craig Sheaffer "sounded off" on political and economic matters. Following this a questionnaire was sent out asking stockholders what they thought of the practice. The answers were 90% in favor of the idea. It also turned out that 40% of those favoring the statement had incomes under $5,000 a year. Certainly these stockholders cannot be classed as persons overly anxious to protect their great wealth. Yet, they are anxious to learn the company's side of the battle for free enterprise.

In war or in peace the long range program for selling private enterprise must go on. There is no more convenient or important channel than that from company president to stockholder through annual and quarterly statements. For those who are now lagging we suggest reconsideration.

Can They Stand More Tax?

IS THERE A LIMIT to the amount of tax load that the utilities can carry? Certainly a 45% income tax rate will add a burden that, on top of all the others, will present serious problems to many companies. Should the radical form of excess profits tax imposed during the last war be added, the weaker members of the industry might be placed in an extremely vulnerable position.

Inability to finance at a reasonable interest rate would be the first danger. But on top of this, a failure to compete successfully with federally subsidized and tax-free power suppliers could be a natural consequence. The impressive seriousness of this situation cannot be passed over lightly.

Studies of the effect of the 45% tax have shown that under conditions existing during the past 12 months, dividends can be covered adequately except in a few instances. Obviously those companies whose margins are wiped out will have to secure rate increases at an early date. On the average the current dividend rates are no more than 80% of the income after applying the 45% rate. This is a satisfactory margin as long as the growth picture is as bright as it now appears. Even some substantial increase in operating expenses can be absorbed under foreseeable conditions.

Looking into the potential dangers of the future, it is obvious that the tax burden on the utilities must not be increased. Where, through a fortunate circumstance, a company is earning more than the rate of return required to finance adequately, such excess should be returned to the customers in the way of a rate reduction. By this means no accusing finger can be pointed at the members of the utility industry.

There can be no real excess profits in a regulated industry. This point should be made clear to the tax planners.

The electric utilities along with the regulatory commissions should use every means at their disposal to assure the industry fair treatment in federal tax matters. The industry cannot afford to fight a tax on excess profits. But it should get behind all efforts to make the tax completely fair in its operation.

"Mounds" and Street Lighting

THE WORST THING about a chronic condition—of the body personal or of the body social—is that usually it can be lived with. Except for the occasions when it manifests itself by pain or discomfort, it is accepted into the ordinary state of affairs, is unquestioned, ignored, never thought about. That is the general case of street lighting. Most of our cities, towns, and villages have poor street lighting simply because the people are used to it and accept its dangers and inconveniences. They are like a man with chronic arthritis who can get around well enough and who has never heard of cortisone.

Effort is being made to tell the people about the cortisone of modern street lighting. That effort is being rewarded in terms of averted traffic accidents and of prevented crime. But in the national picture the reward is much too little. It is, and can be, only proportional to the effort which is itself small in comparison with what it should be.

Ponder this. A. F. Dickerson, long known for his evangelism in the cause of better illumination of our streets and highways, stated recently that the people of this country spend more money every year for a single kind of candy—"Mounds"—than they do for street lighting. Think of it. Night traffic accidents took a toll of about 20,000 lives last year, caused many more non-fatal injuries, wasted millions of dollars in property damage. In addition thousands of crimes were committed under cover of darkness. And that ghastly and expensive record weighs less in the public mind than the sweet tooth asking for one particular candy. The reason, of course, is that poor street lighting is chronic. Man, let's have a lot of illumination cortisone. It is badly needed.

The Electrical Week

The main section of this issue contains a forecast of what the industry will do in the remaining months of 1950 and in 1951. The News Section also makes a forecast. The industry will have to live under, with, and by government controls for many months and perhaps years. Interior Secretary Oscar L. Chapman will call in some 70 heads of operating companies to sit down with two public power representatives to frame the criteria for allocating materials and equipment to power projects (p 98) . . . National guardsmen and service reservists employed by utilities and electrical manufacturers are not exempt from call to duty. Under certain circumstances, however, they can be deferred (p 98) . . . Highlights of the Defense Production Act are listed on Page 99 . . . The Seattle Gas Co claims Seattle City Light is unfair. The big municipal is practically subsidizing the installation of electric ranges and water heaters (p 100) . . . The summer is no longer a slack season for many utilities. Cooling aids are building up demand and energy consumption (p 101) . . . American Gas & Electric in subsidiary Appalachian Electric Power Co's territory will build a 300-kv transmission line and a power station with an ultimate capacity of 1,050,000 kw (p 101) . . . Plans of the Northwest Power Supply Co to construct a power project on the Deschutes River in Oregon received a setback when the State Fish Commission refused to authorize the project (p 103) . . . Electric Bond & Share Co, once the largest electric holding company registered under the Holding Company Act of 1935, now is practically out of the domestic power business (p 104).

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Recent drought conditions have increased the interest of farmers in Worcester County, Mass., in electric pumping for irrigation.

An investigation by Congress of Interior Secretary Oscar L. Chapman and Reclamation Commissioner Michael Straus has been advocated by Sen Andrew F. Schoeppel, Kansas Republican. Both are charged with having signed oaths of office on forms in which the "loyalty clauses" had been scratched out. Chapman later signed another affidavit in which the "loyalty clause" was retained.

Curiosity Dept—Wonder how much bigger stockpiles and inventories would be if there hadn't been so many strikes.

Detroit Edison Co discussed EEI's proposed "National Water Resources Policy" in a recent report to its stockholders. As a result it has received and is filling 3,700 requests for copies.

Congress is considering upping the annual salaries of Atomic Energy Commissioners from $15,000 to $20,000.

Russia has announced a new hydroelectric project at Kuibyshev on the Volga. The project is to have a total capacity of 2 million kw.

Total installed capacity of central stations in the United States as of Aug 1 was 66,193,079 kw.

General Electric Co may cut its production of television receivers 20% as a result of increasing government orders for electronic equipment.

Wonder what electric utility will be the first to put female meter readers on the job to conserve manpower?

Edison Electric Institute is organizing an industry committee with the view of having a group to confer with the government as needed. The group will also gather information to exchange within the industry.

When the IUE-CIO can get six holidays with pay in its contracts, it will try to include Election Day among them. It claims to have gained this concession in some plants. CIO's Political Action Committee is behind the idea to get more workers to the polls.

Grand Coulee has put its 14th 108,000-kw generator into operation. Another is to be ready Oct 15, and three more are to go on the line next year to complete the 18-unit installation.

Soft coal production will soon be above the 1949 rate. It is now only 2% behind last year.

Notes From The News

Kansas Gas & Electric Co will name its new power plant to be constructed near Wichita the Murray Gill Plant in honor of its president . . . To raise $22,000 a year for installation of an ornamental street lighting system, city commissioners of Vancouver, Wash., have approved a 3% tax on sales of electricity . . . Tampa Electric Co has purchased from U.S. Phosphoric Products, Inc, the lines and facilities used to serve the territory adjacent to the company's plant.

Forecast for Industry—More Controls

Utilities and Manufacturers Must Operate under Defense Production Act, But Government Will Ask Private Enterprise for Cooperation

The importance of government controls to the industry cannot be overemphasized. For months, and perhaps years, the industry must live under, with, and by them. On this page and the pages following ELECTRICAL WORLD presents stories and interpretations of the latest government regulations—Editor

POWER COMPANY executives will be called to Washington to write the ground rules for materials allocations within their own industry—public as well as private. As soon as President Truman issues his executive order putting into effect allocations authority under the Defense Production Act, Interior Secretary Oscar L. Chapman will invite 60 to 75 heads of operating companies to form an industry advisory council and draft the basic criteria for allocating equipment and materials to power projects.

Interior to Allocate Power

Barring unforeseen hitches, President Truman will delegate allocations authority to the Interior Department for the three major fields of power and water, solid and liquid fuels, and mineral resources development. Secretary Chapman plans to set up an advisory council and administrative staff to handle allocations for the power industry.

A power advisory council will be an entirely new undertaking. But Interior already has advisory councils for petroleum, minerals, and bituminous coal. The experience of these councils gives them a useful basis on which to build their allocations machinery.

Private Representatives to Predominate

For the new power advisory council, writing the allocations criteria will be its first and probably most important job. There will be only two public power representatives. One will represent TVA, and the other will be appointed from the Interior Department—somebody like Paul J. Raver, administrator of the Bonneville Power Administration.

These two representatives will be present for only one purpose—to see that public power interests are not overlooked or forgotten in the discussions. They will be a small minority in the large gathering, but their words will carry weight. After all, the criteria have to be approved by the Interior Secretary.

Once the private power people have developed the basic standards for parceling out materials and equipment among industry construction projects, Chapman is willing to bet his job that he can apply the same rules clear across the board, to public as well as to private power operations. He feels that the advisory council will lay the cornerstone for industry cooperation between public and private power proponents. National Defense planning, he thinks, gives a golden opportunity to get the two teams to work together.

To Penalize Neither Group

It is Chapman's intention, as he plainly states, to penalize neither private nor public power during the period of national defense effort. He asserts convincingly that allocations criteria and all other administrative regulations will be interpreted and applied with the sole objective of giving a fair and impartial break to all power developments for the benefit of the national defense economy.

No time will be lost in setting up allocations machinery for power projects. Chapman plans to act promptly in calling together the advisory council to draft the criteria.

An industry executive will be brought in to head the administrative staff for materials allocations to power projects. New people have to be recruited for this staff, and most of them will have to come from outside the department. Money for this operation—as for other defense production units to be set up in Washington—will be allocated from supplemental defense appropriations and will not have to be taken out of regular department budgets.

Independent Group Planned

This will be an independent staff operation, separate from the permanent Interior Department organization, reporting directly to Secretary Chapman. For bookkeeping purposes only, the money expenditures of the new staff will be coordinated under the assistant secretary responsible for budget and finance.

Actually, the allocations unit in the Interior Department will function as a claimant agency. It will determine the assignment of priorities for materials and equipment among power projects within the industry. Its decisions will be made on the basis of the standards adopted by the advisory council and approved by the Secretary. The criteria will specify the basis of judgment and order of importance for such considerations as defense power needs in an area, critical materials and equipment involved in a project, and time required for completion. All these factors will be weighed in relation to the requirements of the Defense Department and the Munitions Board.

From Interior, allocations decisions will go to the Commerce Department, which will have the final say on disposition of finished parts and products, such as generators.

Chapman and Commerce Secretary Charles Sawyer have worked out and signed an agreement to facilitate the cooperative functioning of the claimant agency and the final allocation authority. This working agreement will probably be mentioned in the President's executive order delegating priority and allocations powers to the departments.

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Guardsmen, Reservists Not Exempt from Duty

Are employees of electric utilities or electrical manufacturers who are members of the organized reserves of the nation's defense units or the National Guard exempt from call to duty? Broadly speaking the answer is a blunt "No." There are no blanket deferments in any industry or in any particular job.

Each reservist or guardsmen will be considered on an individual basis. He may apply for deferment and may have his employer second his plea. Delays will be only for six months at a time. Requests should be filed with the state adjutant general for guardsmen and with the military district commander for reservists.

To get favorable consideration for delay an employee must:

1. Be in a critical occupation in an essential activity. Both electric utilities and electrical manufacturing have been declared "essential" on the list issued by the Department of Commerce. Critical occupations as listed by the Department of Labor include engineers, tool and die designers and makers, instrument repairmen, machinists, and maintenance mechanics. Or

2. Hold a critical key managerial job. Or

3. Be enrolled in an educational institution or be engaged in research or scientific activities. Or

4. Have compelling (hardship) reasons for delay.

Meeting one of these conditions does not assure delay. It only makes the individual eligible to be considered for deferment.

Shortly after World War II special reserve units were organized in electric utilities and affiliated with the Army Corps of Engineers (EW, Aug 21, 1948, p 5). None of these units has been called to duty. The number organized is secret.

Thus far the lists of critical occupations and essential industries are being utilized only by the Department of Defense as a guide in considering delays for reservists and national guardsmen. Pressure is being brought on Selective Service officials to apply the lists in considering draft deferments.

No manpower controls are contemplated in the "current situation," meaning war confined to Korea. There are shortages of certain skills in some areas, but there is no general shortage of labor as yet. Public employment offices are beginning to give preference service to employers in essential industries.

Hoyt to Head Interior's Water, Power Division

In a first step to staff the recently established water and power development arm of the Department of Interior, Secretary Oscar L. Chapman, Aug 28, announced the appointment of William Glen Hoyt to head a new Division of Water and Power under Assistant Secretary William E. Warne.

Other appointments were Edward P. Eardley, chief engineer and chief of water power operations; Reginald C. Price, chief of project review and coordination, and John P. Robertson, executive officer.

The new division takes over the functions previously carried on by two units which have now been abolished, the old Power Division and the Water Resources Committee. In the administrative setup of the department, the divi-

Highlights of Defense Production Act

For many months, and perhaps years, all business, including electric utilities and electrical manufacturers, will operate under the provisions of the Defense Production Act of 1950. The act gives President Truman practically full control of our national economy. The many controls will be applied slowly and lightly at first. But if our security is threatened, tight controls strictly enforced will be the order of the day.

Here are brief descriptions of the various sections of the act:

Priorities and Allocations—

Producers can be ordered to accept defense contracts and to put them ahead of all other business. All materials can be controlled. Defense orders must come first followed by essential civilian needs. The President will determine what needs are essential. Inventories can be limited. Consumer rationing can be ordered. Penalties for violation are fines up to $10,000 and prison sentences up to one year.

Requisitioning—

If there is no other way to obtain them and if they are needed immediately, any materials, parts, and equipment necessary for manufacturing, servicing, or operating defense needs can be requisitioned by the President. Just compensation will be paid. If the owner disagrees, he gets 75% of the government's offer and can sue for the difference. Original owners will get first chance to buy back requisitioned property when the government no longer needs it.

Expansion of Productive Capacity and Supply—

For facilities necessary to defense and for the development of new sources for essential materials the government through the Federal Reserve System will guarantee loans to expand output. The government can also make long-term purchase contracts for defense-needed items and pay more than the market price (give a subsidy).

The government can make direct loans to expand production. The Reconstruction Finance Corporation or any agency the President directs can handle these, or a new agency can be set up.

Up to $2 billion is authorized for the expansion program. The first $600 million can be secured immediately from the Treasury. Congress can appropriate the remainder later.

Price and Wage Stabilization—

In general the first price and wage controls will be on a voluntary basis. The anti-trust laws can be suspended if necessary. If voluntary methods fail, the President can order price and wage ceilings on everything. If prices rise much above the May 24-June 24 level, voluntary ceilings will go out the window. Prices and wages are tied together and must move together. The President can remove or raise price ceilings to stimulate production for national defense.

Settlement of Labor Disputes—

The President is given no power to order settlement of labor-management disputes. Voluntary action is the word. He can set up disputes machinery along the lines of the old War Labor Board. But nothing is to be done contrary to the Fair Labor Standards Act or the Taft-Hartley Act.

Control of Consumer Credit—

The Federal Reserve Board is given full power to regulate installment credit. This applies to electrical appliances.

General Provisions—

A "Watchdog" Committee of five Senators and five Congressmen will keep an eye on how the President uses his power.

The price and wage control powers are scheduled to expire June 30, 1951. Other controls imposed before next June 30 can continue in effect until June 30, 1952.

RESULTS of a low-flying, cotton-dusting airplane's striking a 115-kv line are being examined by Tom Rauch, left, Morrilton manager for Arkansas Power & Light Co, and Thomas Lewis, line foreman. The plane severed the aluminum wrappings on the conductor and pushed them along the steel supporting core for a long distance. The steel core held, and the line was kept in operation until after midnight when a scheduled interruption permitted repairs

sion serves all of Interior's water and power programs.

An Economics and Program Division also is to be set up under Assistant Secretary Warne in his water and power development wing of the department, but no people have been selected yet to staff it.

Hoyt has been vice chairman and executive officer since 1944 of the department's Water Resources Committee. He joined the Geological Survey in 1907 and during the following 37 years filled a number of important positions in the water resources branch and the conservation branch of the USGS.

Eardley, an employee of the Interior Department since 1948 and a former consulting and construction engineer with the Rural Electrification Administration, has been acting director and chief engineer of Interior's Power Division.

Price has been special assistant for the last three years to Assistant Secretary Warne. Prior to that, he served for one year as engineering economist with the Bureau of Reclamation. Earlier government service included work as hydraulic engineer with the National Resources Planning Board and assistant to the chairman of the Federal Power Commission, as well as survey analyst with the Office of Land Utilization, Department of Agriculture. Before joining the Reclamation Bureau in 1946, he was assistant professor of engineering at New York University for three years.

Robertson has been assistant to the director of the Power Division since 1943. Before joining the division, he had worked in several positions for the General Land Office and had served as secretary to the late Sen. George W. Norris of Nebraska.

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Farm Equipment Book Out

A book on farm electrical equipment has been published by Edison Electric Institute. Entitled *Farm Electrical Equipment Handbook*, it contains descriptions of electrical farm equipment, illustrations, and purchase price ranges and kwhr consumption of each piece of equipment. The book, costing $2.25 for a single copy, may be ordered from Edison Electric Institute, 420 Lexington Ave, New York 17, N. Y.

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To Add 60,000-Kw Unit

Potomac Electric Power Co will add a 60,000-kw unit to its Benning Road Plant, located in northeast Washington. The unit is scheduled to be completed in 1952.

'Unfair,' Says Gas Firm of Seattle Light Policy

Seattle City Light has been charged with unfair competition by the Seattle Gas Co. In a letter to stockholders N. Henry Gellert, president of the gas company, pointed out that City Light is offering "outright subsidies ranging from $35 to $100 in installations" of electric ranges and water heaters. The gas company cannot meet this kind of competition, he asserted.

City Light began its campaign May 1 to improve its competitive position when the area receives natural gas, perhaps late next year. It has been installing more than 100 ranges and water heaters each week. The city system charges $30 for installing a range and water heater in a single-family residence, an admitted subsidy of up to $75. If the house is wired for a range, it offers free installation of a heater of 50-gal capacity or larger, a subsidy of $35. It also offers free range installation, costing $65 or $70.

Gellert criticized City Light for taking on new customers, "notwithstanding the critical power supply." City Light counters that water heaters, in particular, are ideal load builders because they use a little power around the clock rather than a lot of power at peak periods.

"City Light is spending $85 million in building up its plant and needs additional revenues to meet its bond charges," said E. R. Hoffman, City Light superintendent.

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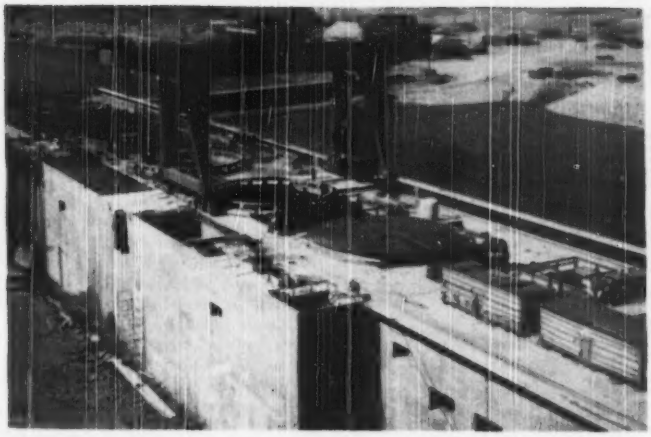
City Utilities Held Liable for Street Light Safety

The Michigan Supreme Court has ruled that cities operating their own electric systems are liable for the safe condition of street light poles.

The court affirmed a judgement of $5,000 against the city of Hart in the electrocution of a 16-year-old boy who came in contact with a metal street-lighting post apparently charged with electricity. A metal plate, missing at the time of the accident, allowed moisture to enter the post. The electric wires were carried through the streets by underground conduits.

The court held that the proper installation and maintenance of the street lighting system is included in a city's statutory obligation to maintain streets, highways, and sidewalks in safe condition. The statute removes the municipality's common law exemption from liability for the exercise of a governmental function, the court declared in its decision.



CIRCULAR OPENINGS in roof of the semi-outdoor power plant at Davis Dam will permit installation of five 45,000-kw generators. All are to be in operation next year. This Bureau of Reclamation project is on the Colorado 67 miles below Hoover Dam

Summer Cooling Aids Raise Load and Output

The days when summer meant a great drop in energy consumption and demand are gone. At least they are gone in the sections of the country where temperatures and humidity are high. The reason is that people like to be cool and comfortable; so the use of air conditioning, attic fans, room ventilators, and ordinary electric fans is growing at an accelerated pace .

Executives responsible for operation of systems having large loads of this type have studied the trends to determine the extent to which weather conditions affect system loads.

One of the greatest effects is recorded on the Union Electric Co system in St. Louis and the surrounding area. There the output increases at the rate of 100,000 kwhr per day for each degree of maximum mean St. Louis temperature above 72 F. The 24-hr average hot weather load was 71,000 kw in 1949 when maximum mean St. Louis temperature reached 90 F.

Memphis, Tenn., reports that sometimes peaks are heavier when humidity is high and temperature somewhat lower than on other days when temperature is high and humidity low.

Texas Electric Service Co, Fort Worth, reports that there is a cumulative effect of several days of extreme temperature. For example, if the maximum is 100 F for each day of the week, the demands by Thursday and Friday will be far more than on Monday and Tuesday.

New Orleans Public Service, Inc, supplies a "guestimate" that air conditioning demand totals approximately 33,000 kw and that annual usage is 63 million kwhr. It also reports that ice making, another big "summer cooling" demand, totals about 12,000 kw with an annual usage of 69 million kwhr. Using these figures the utility figures that these two uses of energy represent approximately 20% of the peak system load.

Birmingham Electric Co estimates that in 1949 air conditioning accounted for nearly 14% of its total new revenue.

Egg Situation Brighter Under Invisible Light

Ultraviolet light makes hens lay more eggs, Department of Agriculture scientists have discovered. It stepped up egg output by as much as 19% in tests at the Agricultural Research Center.

The experiments resulted from an accidental discovery while scientists were trying to find out whether bactericidal ultraviolet light (the very short invisible rays) would kill air-borne bacteria in a poultry house. Noting that the hens were laying more eggs, the researchers decided to concentrate on that angle. Tests were conducted in a poultry house from which natural light was excluded. The effect of ultraviolet light in open-air poultry houses has not yet been determined, nor is it known just what properties of ultraviolet radiation encourage laying.

300-Kv Line, Million-Kw Plant Planned by AG&E

A super high-voltage (300/315 kv) transmission line and a power plant with an ultimate capacity of 1,050,000-kw are the latest additions to the construction plans of Appalachian Electric Power Co, part of American Gas & Electric Co's Central System.

The transmission line will connect the new plant to the Philip Sporn Plant near Graham Station, W. Va. AG&E's head, Philip Sporn, said of the line:

"This step to super-voltages comes as the culmination of a great many years of experience in operating a high-voltage power system and of three years of intensive development work in our high-voltage laboratory at Brilliant, Ohio. At the voltage adopted, 300,000 to 315,000—higher than any now operating in the United States—heavier loads can be carried with greater economy."

The new plant will be built on the Kanawha River some 25 miles upstream from Charleston, W. Va. The initial installation will consist of two 175,000-kw units. It is expected to have the first unit ready by late 1952 and the other by the following summer. Provision will be made to add four units of the same size as needed.

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Average Residential Bill Down in 1950, Says FPC

The average American residential electric bill was from 5 to 10% lower last January than on Jan 1, 1940. At the beginning of 1950 it was slightly below the Jan 1, 1949, level, according to the Federal Power Commission's annual report on typical residential bills for cities of 2,500 or more population.

Data were compiled on typical 25, 100, and 250-kwhr bills for 3,840 communities served by 1,210 utilities. The average bill for 250 kwhr was $6.98 on Jan 1, 1950, compared to $7.37 on Jan 1, 1940 and $7.01 on Jan 1, 1949.

During 1949 11.5% of the communities had increases, and 11.1% had decreases in the residential bill most subject to change under existing rate schedules. Though increases had a slight edge in number, average bills declined because the decreases were greater.

Most changes in 1949 were brought about by the application of fuel, tax, and commodity clauses in rate schedules. Such clauses were a part of the rate schedules in 723 communities and were operative in 418. Typical bills in 57 more communities reflected the operation of fuel clauses at the beginning of 1950 than on Jan 1, 1949.

Changes in Capacity Reported to Federal Power Commission

PLANT ADDITIONS DURING JULY

Utility	Plant	Fuel	Capacity (Kw)
Central Maine Power Co.	Farmingdale	S	4,000
New Bedford (Mass.) Gas & Edison Light Co.	Cannon Street	S	30,000
Hartford (Conn.) Electric Light Co.	South Meadow	S	45,000
Columbus Electric Light Department	Columbus, Ohio	S	12,500
Marshfield Electric & Water Department	Marshfield, Wis.	S	6,000
Akron Municipal Light & Water Works	Akron, Iowa	IC	360
Corn Belt Power Cooperative	Humboldt, Iowa	S	7,500
Missouri Power & Light Co.	Mexico	S	11,500
Vermillion Municipal Light Department	Vermillion, S. D.	IC	340
Oxford Light & Power Department	Oxford, Nebr.	IC	805
Fairbury Light & Water Department	Fairbury, Nebr.	S	4,000
Western Light & Telephone Co.	Concordia, Kan.	S	5,000
Central Operating Co.	Philip Sporn, W. Va.	S	125,000
Lakeland Light & Water Department	Lakeland, Fla.	S	20,000
Tampa (Fla.) Electric Co.	Hookers Point	S	30,000
Louisville (Ky.) Gas & Electric Co.	Paddy's Run	S	60,000
Tennessee Valley Authority	Wilson	H	7,000
Gulf States Utilities Co.	Riverside, Texas	S	40,000
Texas Electric Service Co.	Morgan Creek	S	18,750
Bureau of Reclamation	Kortes, Wyo.	H	12,000
Central Municipal Electric Light & Power System	Carter, Colo.	IC	504
Southwestern Public Service Co.	Roswell, Texas	S	18,750
Bureau of Reclamation	Coulee Dam	H	108,000

PLANT RETIREMENTS DURING JULY

Cazenovia (N. Y.) Electric Co.	Cazenovia	H	180
N. Y. State Electric & Gas Corp.	Chatham	H	150
Pennsylvania Power & Light Co.	Laceyville	H	60
Lebanon Electric Light Department	Lebanon, Ohio	S	400
Dayton (Ohio) Power & Light Co.	Washington	S	750
Rantoul Water & Light Department	Rantoul, Ill.	IC	170
Missouri Power & Light Co.	New Haven	IC	60
Otter Tail Power Co.	Baltinese, N. D.	IC	400
Montana-Dakota Utilities Co.	Mandan, N. D.	S	710
Dakota Public Service Co.	Dickinson, N. D.	S	500
Dakota Public Service Co.	Mott, N. D.	IC	238
Western Light & Telephone Co.	Coldwater, Kan.	IC	190
Nicholasville Light & Water Plant	Nicholasville, Ky.	S	950
Forrest City Water & Light Co.	Forrest City, Ark.	IC	3,540
Public Service Co of Oklahoma	Fletcher	IC	60
Lamar (Colo.) Light & Power Department	Lamar	S	1,000

H—Hydro, IC—Internal Combustion, S—Steam
United States Capacity as of Aug 1—Steam, 46,998,061 kw; Internal Combustion, 1,839,138 kw; Hydro, 17,355,880 kw; Total, 66,193,079 kw.

Seattle City Light's Plan to Buy Building Opposed

Seattle City Light's plan to buy an office building in downtown Seattle has met with opposition from real estate interests and from the architect who designed the City Light Building. The plan has been referred to a committee of the city council.

The Seattle Real Estate Board opposes the proposed purchase of the building for a reported $800,000 because the purchase would remove the building from the city's tax rolls.

Earl W. Morrison, architect who designed the City Light Building, contends that a 24-story tower could be added to the building "at no greater cost on an area basis than you would pay for the office building." Cost of a 10-story addition is estimated at $1,300,000.

City Light officials favor buying the office building rather than construction of a tower on the grounds that towers are expensive to maintain as well as to build. They also claim that eventually the department will require the entire block occupied by the city building, the office building in question, and another structure.

The office building is located across an alley from the City Light Building. City Light now rents space there.

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Ebasco Signs to Manage Greek Electric System

Ebasco Services, Inc. and the Greek government have signed a five-year contract under which Ebasco will manage the design, construction, and operation of a nationwide electric power system in that country.

The total development is to cost $200 million, and the Economic Cooperation Administration is assisting in the financing of program. The estimated cost of the authorized projects is $83 million.

These projects are a 68,000-kw plant, using lignite for fuel, near Alaveri on the Eubean Gulf; a 40,000-kw Agra hydro plant on the Vodas River; a 50,000-kw hydro plant on the Ladhon River; and a 5,000-kw hydro plant on the Louros River. About 700 miles of 150-kv transmission lines, the first stages of a national grid connecting all generating plants, will also be built.

Walter Burke, a retired vice-president of Ebasco, will be general manager of the system.

Australia Will Double Power Capacity by 1958

Australia's electric generating capacity will more than double by 1958, according to a survey recently completed by the Ministry of National Development.

Installed plant capacity in 1958 is estimated at 5,574,533 kw, based on projects now under construction and developments which have been approved. On March 1, 1950, plant capacity stood at 2,123,337 kw. By 1975 capacity is expected to rise to 8.8 million kw. Included in the 1975 figure is the Snowy Mountains project which should provide about 2.8 million kw.

The power expansion program between now and 1958 is expected to cost Australia $618,240,000. The cost of the Snowy Mountain project, not included in this estimate, may total $448 million over the next 25 years. These programs are being undertaken by the electricity supply authorities in all states and by the federal government.

At present, steam generators provide 81% of the total installed capacity, hydro generators 14%, and oil 5%. In 1958, steam generation will rise to 83%, hydro 15%, and oil will drop to 2%. By 1975, the percentages will probably be 53% for steam, 45% for hydro, and 2% for oil.

Consumption of electricity in Australia has increased sharply in the last 12 years. In the year 1938-39, 4,688,000,000 kwhr were consumed. By 1947-48 consumption rose to 8,368,000,000 kwhr, and in 1948-49 it climbed to 9,043,000,000 kwhr. Future rises are expected to be even more spectacular.

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City OK's BPA Contract

A 20-year contract with Bonneville Power Administration has been approved by Centralia, Wash., officials. Under the contract BPA will supply all power the city may wish to use on a noninterruptible basis. The contract is the third signed by the city and BPA since 1940, the first two being of 5 years duration. The purchase price agreed upon is 75¢ a kw of demand, plus ¼¢ energy charge per kwhr.

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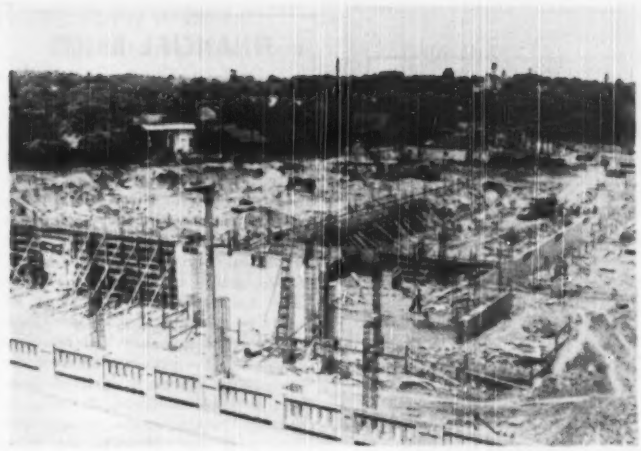
Canadian Plant Completed

Ashcroft Water & Electric Co has completed a new 500-hp plant and dam on the Bonaparte River. Service has been extended to Cache Creek, six miles north of Ashcroft, B. C. The original plant, also with a capacity of 500-hp, will continue in service.



NASHVILLE (TENN.) ELECTRIC SERVICE will use this structure when completed as a headquarters and service building. Five stories high, it will cost $2,323,575. Building will house sales, engineering, accounting, operating, and the customers service departments. An adjoining warehouse, pole and transformer storage yard, transformer shop, and automobile storage and repair shop are also provided. The site of 8 acres is in a central location

Oregon Body Refuses to Okay Dam Project

Plans of the Northwest Power Supply Co to construct a $12-million dam on the Deschutes River in north central Oregon received a setback when the Oregon State Fish Commission refused to authorize the project.

Northwest Power Supply was formed early in 1949 (EW, Jan 20, 1949, p 93) by three private utilities, Pacific Power & Light Co, Portland General Electric Co, and Washington Water Power Co, to develop power resources and provide themselves with wholesale energy.

Proposed construction of the project, known as Pelton Dam, stirred up a major battle in the 1949 session of the Oregon legislature between the fish and power interests. Commercial fishing interests and sportsmen's organizations joined in opposing the project, claiming that the dam would destroy valuable fish runs. The legislature named an interim committee to study the proposal.

The State Hydroelectric Commission asked the fish commission to approve the project before granting authorization. The fish commission was given power to grant the permit if the company would build a hatchery according to plans proposed by the commission.

In refusing to authorize the project, the fish commission held that the company did not submit any plans for fish rehabilitation in waters adjacent to the dam.

Thomas M. Robins, president of Northwest Power Supply, expressed surprise at the commission's ruling. He asserted that negotiations were still going on concerning the protection and preservation of fish migration and that he did not consider agreement as hopeless.

Application to the Federal Power Commission for a license for the project is still pending. Robins claims that FPC has final jurisdiction in the matter.

Plans for the project call for a powerhouse below the dam mounting two 37,500-kw generators.

Pilots Make Sunshine to Speed Work on Dam

Making sunshine is the latest wrinkle in controlling the weather in Oregon. California-Oregon Power Co has hired two weather-making pilots to keep clouds away from Toketee Falls Dam, now under construction in the Cascade range east of Medford, Ore.

Sunshine is needed to dry out soil used for the earth-filled dam. Last year work on the dam was delayed because the soil didn't dry out sufficiently.

So far sunshine-making has proved successful, company officials believe. The pilots use their own secret, cloud-killing spray and take off whenever fog rolls up the Umpqua River canyon.

June Energy Sales Up 14% over June of 1949

June electric energy sales were 14% above those for the same month last year, Edison Electric Institute reports.

Sales to ultimate customers in June totaled 22,694,422,000 kwhr, compared to 19,905,282,000 kwhr in June, 1949. Revenue from ultimate customers was $414,734,400, or 11.6% above the $371,-461,800 figure for the corresponding month a year ago.

Classification of Sales, June

Kilowatthour Sales June	Million Kwhr 1950	1949	Percent Change
Residential or domestic	5,072	4,374	+16.0
Rural (Distinct Rural Rates)	694	664	+ 4.6
Commercial or industrial			
Small light and power	4,107	3,760	+ 9.2
Large light and power	11,547	9,889	+16.8
Street and highway lighting	192	178	+ 7.8
Other public authorities	583	522	+11.6
Railways and railroads			
Street and interurban rlwys	261	285	− 8.4
Electrified steam railroads	189	188	+ 0.7
Interdepartmental	49	46	+ 6.8
Total to ultimate customers	22,694	19,905	+14.0

For the 12 months ended June 30 average use per customer was 8.6% above the 12 months ended June 30, 1949, 1,765 kwhr compared to 1,625 kwhr. Average annual bill was up 6%, from $48.43 to $51.36. But revenue per kwhr declined 2.3% from 2.98¢ to 2.91¢.

PUD Seeks to Operate AEC System, Cut Waste

Benton County Public Utility District, Prosser, Wash., has asked permission of the U. S. Atomic Energy Commission to supply power to the nearby city of Richland. It claims it can cut the amount of power being wasted in the city by 35%.

All electrical facilities in Richland are operated by AEC in connection with the Hanford Works. No power is metered. The PUD proposes to take over the facilities and to meter all electricity. If permission is granted, it will construct an office and station building in Richland.

Utility to Install 80,000 Kw

Two 40,000-kw high pressure turbogenerators have been ordered by Florida Power Corp for installation at its Avon Park and Booth Point Plants. The Avon Park Plant installation is expected to be completed by the fall of 1952; the one at Booth Point is scheduled for completion during 1953. The units will boost the utility's capacity to 298,000 kw by the end of 1953.

YIELDS (%) — Operating Electric Utility Securities

Quality	Bonds			Preferred Stocks			Common Stocks		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
DATE									
1950									
Aug. 31	2.62	2.62	2.72	3.80	4.03	4.45	5.79	6.63	7.41
Aug. 24	2.61	2.61	2.72	3.81	4.05	4.37	5.71	6.51	7.32
Aug. 17	2.60	2.61	2.72	3.80	4.06	4.37	5.77	6.57	7.36
END OF QTR.									
2nd 1950	2.68	2.66	2.74	3.79	4.03	4.38	5.38	6.51	7.50
1st 1950	2.59	2.61	2.74	3.78	4.01	4.36	5.22	5.85	6.67
4th 1949	2.59	2.61	2.72	3.85	4.06	4.46	5.37	6.15	7.01
3rd 1949	2.61	2.65	2.77	3.88	4.15	4.54	5.55	6.67	7.51

Data, Reis & Chandler, Inc.

One-Time Holding Company Giant Now Out of Domestic Utility Field

THE LARGEST ELECTRIC utility holding company registered under the Holding Company Act of 1935 now is practically out of the domestic power business.

Electric Bond & Share Co no longer has any subsidiary whose principal business is that of a public utility within the United States, according to its 1949 annual report. It has applied for exemption from the Act. Reorganization plans of Electric Power & Light Co and American Power & Light Co now have been carried out, leaving American & Foreign Power Co as the only subsidiary still to be recapitalized.

When Bond & Share registered with the Securities and Exchange Commission in 1938 it controlled 121 domestic subsidiaries, including five major subholding companies, with combined assets of nearly $3½ billion. Now it has an investment in Foreign Power; 27% of the common stock of United Gas Corp; 100% of the stock of Ebasco Services, Inc; less than 8% of the common of various utilities, most of it received in connection with AP&L reorganization; and 47% of the stock of National Power & Light Co, which is in the final stages of dissolution.

American Gas & Electric Co ceased to be a Bond & Share subsidiary in March, 1947, and now is an independent integrated system. Electric Power & Light is being dissolved, and National has disposed of almost all its utility subsidiaries. AP&L retains only Washington Water Power Co and may be dissolved. Foreign Power is working on a reorganization plan. Bond & Share also has disposed of most of its operating companies, including Pennsylvania Power & Light Co and Carolina Power & Light Co.

Bond & Share itself does not plan to dissolve. It proposes to become an investment company, holding Foreign Power, United Gas, and Ebasco and using the money to be realized from its remaining investments, valued at more than $26 million, as venture capital at home and abroad. Ebasco would be called on for technical knowledge and raising of additional capital. Initially some 15% to 20% of Bond & Share's total assets would be devoted to such investments. SEC has not yet acted on this plan.

Since the end of 1944 assets applicable to Bond & Share common stock, leaving out Foreign Power and Ebasco, have grown from $8 million to more than $82 million on June 30. Earnings applicable to common stock have increased from a red figure of $1,813,000 in 1944 to a black figure of $4,185,000, or 80c a share, for the year ended June 30. The latter figure is the highest amount applicable to the common stock for any 12-month period in the past 17 years.

Ebasco earnings of $2 million were 25% above the year before. Dividends paid to Bond & Share totaled $1 million, an increase of 33⅓% over 1948. About 80% of Ebasco's business now is with non-associated clients.

Foreign Power's system has been growing at a rate exceeding the overall growth rate of domestic electric utilities, the Bond & Share report said. For the year 1949 operating revenues were 9% above 1948, and consolidated net income increased more than 30%. Parent company net income, 20% above 1948, was the largest Foreign Power net in the past 18 years.

United Gas earnings decreased from $1.71 a share in 1948 to $1.43 in 1949. However, in the first six months of 1950 consolidated operating revenues were 11% above the same period of 1949 and earnings for the 12 months ended June 30 amounted to $1.51 a share.

FINANCIAL BRIEFS

Southern Co now has acquired from Electric Bond & Share Co 254,045 shares, or 46.56%, of Birmingham Electric Co's common stock in exchange for 381,067 shares of Southern Co common. Other holders of Birmingham Electric may exchange their shares on the same basis, 1½ shares of Southern for each of Birmingham. Alabama Power Co is offering to exchange its shares of 4.20% preferred for 4.20% preferred of Birmingham on a share for share basis. Southern has delivered the Birmingham shares it received from Bond & Share to Alabama Power in exchange for the latter's common and plans to do the same with any other Birmingham common shares to be acquired.

Bureau of Reclamation representatives are conferring with Anchorage, Alaska, officials over bureau purchase of city power rights and property at the site of a $20-million federal hydroelectric project at nearby Eklutna Lake (EW, Aug 28, p 62). Title to the land is vested in the federal government, but the city has a 50-year lease on the water rights and a small dam and hydro plant on the lake. Survey work has already begun.

Step I of the reorganization plan of Eastern Utilities Associates (EW, May 28, p 78) under which the Boston holding company will buy the outside interest in its subsidiary, Fall River Electric Light Co, has been okayed by Securities and Exchange Commission. SEC reserved jurisdiction over Step II, which provides for organization of a new company to acquire the assets of EUA and three of its subsidiaries.

New York State Electric & Gas Corp has been authorized by the New York Public Service Commission to issue and sell to a group of insurance companies $12.5 million of 30-year first mortgage 2.80% bonds and $4 million of $4.15 preferred stock. Proceeds will be used for construction and retirement of short-term obligations.

Standard Gas & Electric Co plans to sell the rest of its holdings in Louisville Gas & Electric Co. The holding company has registered its 137,857 shares, or 7%, of Louisville G&E's no-par common. Proceeds will be used to retire $2,250,000 of Standard bank notes as part of its liquidation. Last September Standard sold 250,000 shares of Louisville common.

Pacific Power & Light Stock to Be Sold Soon

Pacific Power & Light Co will go up for public sale soon.

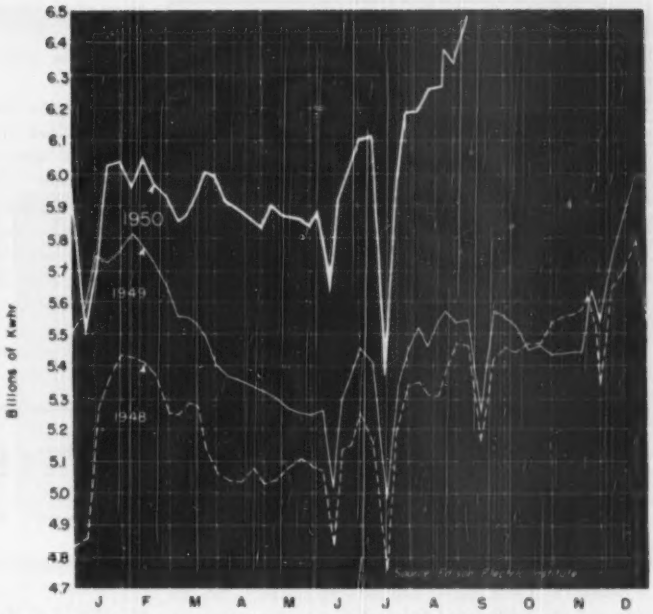
The former American Power & Light Co subsidiary has filed with the Securities and Exchange Commission a registration statement covering all its outstanding 1,750,000 shares of common stock. The stock is owned by 16 holders, headed by A. C. Allyn & Co, Inc, Chicago (11.24% of the stock) and Bear, Stearns & Co, New York (11.24%). Alleghany Corp, New York, which owns 24.19% of the shares, is the only other holder of more than 10%.

Proceeds of the sale will go to the stockholders not the company. Names of the underwriters, offering price, and underwriting terms will be announced later.

PP&L's stock was sold to the present owners for $16,125,000 last February. At that time there were 500,000 shares outstanding. In July the stock was split 3½ for 1.

City Grants Franchise

Graceville, Fla., City Council has voted to grant Gulf Power Co a 30-year franchise. The utility is now serving the city, and its current franchise will not expire for several years. When the new one goes into effect, the city will receive from Gulf Power 3% of the gross receipts from commercial and residential power sold.



Output Week Ended Sept 2—6,459,386,000 Kwhr

Weekly Output, Millions Kwhr

1950		1949		1948	
Sept	2 6,459	Sept	3 5,544	Sept	4 5,470
Aug	26 6,346	Aug	27 5,523	Aug	28 5,478
Aug	19 6,370	Aug	20 5,579	Aug	21 5,391
Aug	12 6,253	Aug	13 5,530	Aug	14 5,318
Aug	5 6,247	Aug	6 5,466	Aug	7 5,319
July	29 6,190	July	30 5,518	July	31 5,352
July	22 6,186	July	23 5,462	July	24 5,342
July	15 6,006	July	16 5,342	July	17 5,197
July	8 5,380	July	9 4,982	July	10 4,760
July	1 6,115	July	2 5,410	July	3 5,166

Percent Change from Previous Year

	Sept 2	Aug 26	Aug 19
New England	+17.0	+17.4	+16.2
Mid-Atlantic	+16.9	+15.4	+14.3
Central Industrial	+20.9	+17.6	+17.4
West Central	+13.3	+11.1	+ 9.9
Southeast	+18.9	+17.3	+14.9
South Central	+18.7	+18.0	+16.0
Rocky Mountain	+15.5	+ 9.5	+12.1
Pacific Coast	+ 7.6	+ 8.6	+ 9.2
Total United States	+16.5	+14.9	+14.2

MEETINGS

Northwest Public Power Association
Convention, Portland Hotel, Portland, Ore., September 13-15.

Electrical Companies Public Information Program
Workshop Conference, Stevens Hotel, Chicago, September 14-15.

International Association of Electrical Inspectors
Southwestern Section, Hotel St. Claire, San Jose, Calif., September 18-20; Eastern Section, Hotel Statler, Buffalo, N. Y., September 25-27; Western Section, Book-Cadillac Hotel, Detroit, Mich., October 2-4; Southern Section, Hotel Sheraton Plaza, Daytona Beach, Fla., October 16-18.

Conference and Exhibit
Sponsored by Instruments and Regulators Division of American Society of Mechanical Engineers and Instrument Society of America, Municipal Auditorium, Buffalo, N. Y., September 18-22.

Pennsylvania Electric Association
Annual Meeting, William Penn Hotel, Pittsburgh, Pa., September 19-20; Transmission and Distribution Committee, from Temple Country Club, Dallas, Pa., October 5-6.

American Society of Mechanical Engineers
Fall meeting, Hotel Sheraton, Worcester, Mass., September 19-21.

Municipal Electric Utilities Association
Annual conference, Hotel Queensbury, Glens Falls, N. Y., September 20-22.

Public Utilities Association of the Virginias
Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., September 22-23.

National Electronics Conference
Edgewater Beach Hotel, Chicago, Ill., September 25-27.

Canadian Electrical Manufacturers Association
Annual Meeting, General Brock Hotel, Niagara Falls, Ontario, Can., September 27-29.

Association of Edison Illuminating Companies
Annual Meeting, Broadmoor Hotel, Colorado Springs, Colo., September 27-30.

Southeastern Electric Exchange
Engineering and Operations Conference, Henry Grady Hotel, Atlanta, Ga., September 28-29; Sales Conference, Biltmore Hotel, Atlanta, Ga., October 25-27.

National Television and Electrical Living Show
Chicago Coliseum, Chicago, September 29-October 8.

Edison Electric Institute
Prime Movers Committee, Copley Plaza Hotel, Boston, October 2-3; Electric Equipment Committee, Chamberlain Hotel, Old Point Comfort, Va., October 9-10; Transmission and Distribution Committee, Hotel New Yorker, New York, October 19-20; Meter and Service Committee, Robert Treat Hotel, Newark, N. J., October 25-27; Industrial Relations Committee, Netherlands Plaza Hotel, Cincinnati, Ohio, November 13-16.

American Institute of Electrical Engineers
Middle Eastern District Meeting, Lord Baltimore Hotel, Baltimore, Md., October 3-5; Fall General Meeting, Skirvin Hotel, Oklahoma City, Okla., October 23-27.

Rocky Mountain Electrical League
Annual Convention, Broadmoor Hotel, Colorado Springs, Colo., October 9-11.

★**Interstate Power Club of New York**
Hotel Martinique, New York, October 9.

Indiana Electric Association
Annual Convention, French Lick Springs Hotel, French Lick, Ind., October 11-13.

Iowa Utilities Association
Management Conference, Fort Des Moines Hotel, Des Moines, Iowa, October 16-17.

International Association of Electrical Leagues
Annual Conference, Copley Plaza Hotel, Boston, Mass., October 11-14.

National Electrical Contractors Association
Annual Convention, Hotel Biltmore, Los Angeles, Calif., October 17-20.

National Farm Electrification Conference
Melbourne Hotel, St. Louis, Mo., October 18-20.

★**Pacific Coast Electrical Association**
Operating Economic Section, Whitcomb Hotel, San Francisco, Cal., November 2; Business Development Section, Californian Hotel, Fresno, Cal., November 9.

Wisconsin Utilities Association
Electric and Gas Section, Schroeder Hotel, Milwaukee, Wis., November 8-10.

National Electrical Manufacturers Association
Chalfonte-Haddon Hall, Atlantic City, N. J., November 13-16.

New Jersey Utilities Association
Annual Meeting, Seaview Country Club, Absecon, N. J., November 17-18.

★ Addition this week.

WASHINGTON COMMENT

RONALD D. ROSS

"A STUDY of Certain Operations of the Rural Electrification Administration" (House Document 2908, 81st Congress, 2nd Session) should be required reading for all electric company executives and for all advocates of public power. This report is an indictment, not of the co-ops, not of the Rural Electrification Administration, but of government management and *per se* of government ownership.

The study reveals poor management and bad business practice on the part of a few co-ops.

The same can be said about REA. The study reveals that a few co-op officials have been dishonest and that some are incompetent. But as the subcommittee which made the study concludes, "For the most part, the REA personnel who testified before the committee gave the appearance of being capable and competent."

There seems little doubt that this is true. Why then have the conditions described in the study been allowed to develop? There can be only one explanation—the red tape and the indifference and inefficiency of government management.

First, let us consider the red tape. Any quoted material is from the study. "Under present REA regulations most of the REA borrowers are required to forward monthly, in triplicate, to Washington monthly financial and statistical reports. The reports required are quite comprehensive and entail a tremendous amount of detailed work on the part of the cooperative's personnel." The co-ops are lucky that seven copies aren't wanted. Anyway some co-ops are spending time and money sending them in. Every month other co-ops are late in submitting them. So the value of the reports is questionable as the study indicates.

Quarterly, the REA compiles a report captioned "Times standard debt service earned." "The formula used by REA (in calculating this report) is D4 minus D24 plus D27/348 plus D32, supplemented by ten pages of explanation." Not very simple is it? But REA has now amended the formula. But as the study says, "This amended formula seems just as complicated as the formula now in use and seems far too intricate to be operated successfully at a reasonable cost."

Second, let us consider indifference and inefficiency of government management. "REA records show that a Louisiana cooperative has, by the admission of the manager, repeatedly followed the practice of using the list of members already receiving service as a basis for application for new loans from REA." Assistant Administrator Wise admitted that no check had been made before loans were granted.

In Minnesota a field man from REA's Engineering Division made approximately 30 visits to a Minnesota co-op where construction work was under way. He found no fault until the final inspection. Then the work was found to be deficient and not according to REA specifications.

In Maryland there is a co-op which the REA administrator testified "gives about the poorest service of any in the United States and . . . is not amenable to any suggested improvement." REA has done nothing.

But most important of all, "Out of 991 energized borrowers, 247 or almost 25% operated at a book loss in 1949 . . . In the early stages of operation losses are anticipated. Moreover, since the deficits are based on accrual accounting many of the deficit cooperatives are in good cash status."

Anyway why worry? The taxpayers are the losers.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Induced-draft fan omission supports about 0.8% improvement in both plant efficiency and plant cost, to say nothing of the eliminated maintenance.

Automatic shut-off devices can be a handicap in (1) Starting up a unit, (2) handling a tough emergency or (3) struggling out of a fuel clog.

Pole-top resuscitation has at least two superiorities over the conventional prone pressure method: it can be applied with less delay and it can move more air in and out of the lungs.

Energized cables (except secondary network) should probably never be moved in manhole operations.

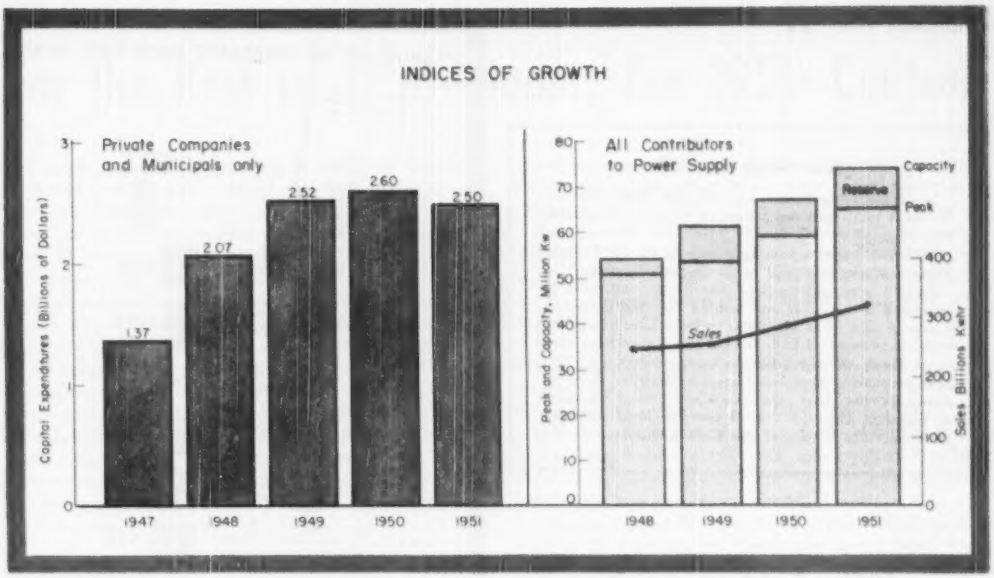
Excess loading indicators are available to warn when derricks and booms are overloaded.

Straps of leather or fabric will hardly stand the impulse of a 200-lb man dropping 6 ft from a working position out on a tower crossarm. Parachute harnesses may be the answer for such operations.

Miners' oil lamps will warn of insufficient oxygen or explosive mixtures in manholes if lowered ahead of the men; carbon monoxide ampules are further protection.

Cable failures are largely traceable to external injury (including corrosion), damage during installation, expansion and contraction and wear at duct mouth.

Sidewalk snow melting installations (pipe or heating cable) would impede use of sidewalk areas for manhole locations if extensively resorted to in downtown sections.



1950 MAY STAND as peak year of construction but not of growth. Reserves will be adequate though peak load will increase about 10%

Utilities Mobilize for '51

Electric utilities are accelerating construction as much as six months to provide adequate power supply for mobilization. Capital budgets $2.5 billion in prospect for '51; estimated growth 13% for '50, 11% for '51

THE RUSH in utility buying during the past three months gave ample evidence of the attitude of the industry toward "mobilization for peace." Manufacturers' bookings running from 20% to 350% increase over April and May show the extent to which preparations have been made. As this speed-up in construction planning is converted into project completions, the investor-owned and municipal utilities will be spending at the all-time high of over $2.5 billion per year. When TVA, electric co-ops, and Federal projects are added the total expenditures should exceed $3.0 billion for 1951.

Past predictions for 1950 and 1951 industry growth must now be discarded. Three months ago the industry forecasters predicted an increase in energy output of 8% for 1950 and 6% for 1951. Today it looks more like 13% and 11% respectively. Peak loads will not increase at the same rate but it is safe to say that they will run near 10%, just sufficient to keep reserve capacity at the present average level of 14% of peak.

Reports from utility presidents covering the entire nation, which are included in this annual forecast issue, give ample proof of the accuracy of these predictions. But in addition to this, the McGraw-Hill Department of Economics has reviewed the entire economic outlook under the mobilization program for the remainder of 1950 and for 1951. In their outline of probable trends we find a picture of expanding business limited only by men and materials. When the program is in full swing the pressure on prices and material supplies will be far too great to hope for a free economy. It is only a question of how much control and when. Some material control measures will probably have become effective before this article appears. The essential nature of the industry's service will assure adequate equipment allocations.

The utility industry stands in a position of strength and preparedness, if it is not strangled by the imposition of an unfair excess profits tax. To a much greater degree than in 1941, it can be said without restraint that electric light and power will not be a limiting factor in the mobilization effort.

Box Score for '50

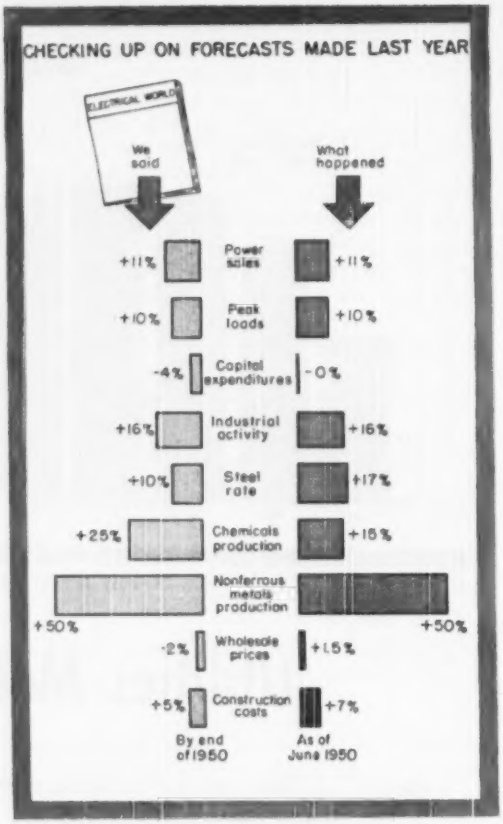
In our last budget issue, Aug. 27, 1949, ELECTRICAL WORLD published the following forecast of business activity in 1950:

"Industrial production, as measured by the Federal Reserve index, may well be in the 195-200 range."

As this issue goes to press, the production index is estimated at over 200 and headed up. We predicted a gain in 1950 of at least 10% in kwhr sales compared with the average of 9.5% for the first 8 months of this year. These and our other forecasts, made during the 1949 recession, were considered optimistic. But—as shown on the chart—they have since been equalled or bettered, although few of the published statistics yet reflect the impact of the Korean War.

What Happens When You Spend $15 Billion?

A boom limited only by men, materials, and industrial efficiency is in prospect for 1951 with either war or peace



DURING THE 1949 RECESSION ELECTRICAL WORLD forecast that business activity would rise and carry the indexes to the levels shown by the end of 1950. These levels were attained, in most cases, by June 1950 and would probably have held to the year-end. But now the Korean War will push economic indicators higher. Only men and materials will limit business expansion through '51

Our "Forecast for Fifty" was "a year of normal prosperity." And so it was until very recently. Production rose close to capacity in most lines. Unemployment held at about 5% of the labor force. Prices remained stable on the average, with a drop in farm commodities offsetting higher quotations for industrial materials.

The state of business now can only be described as a boom—a boom with capacity production and rising prices all along the line. The peak season in construction and in automobile production has turned out bigger than expected. And just at this boomingest time for the civilian economy, the United States has entered a small-scale war which will require additional billions for military equipment.

We cannot know how long hostilities in the Far East will last or where they may spread. No attempt is made here to forecast the course of this conflict. But this much is clear: The United States has undertaken a major rearmament program. At least $15 billion per year has been added to government expenditures. And the sure result is rising business activity for the remainder of 1950, and well into 1951.

The problem for business, and for the power industry particularly, is no longer sales but capacity. We must now produce enough to satisfy military needs on top of a record civilian boom. But in planning to meet these requirements, new questions arise:

How fast will this new demand grow ?

How will the cost of metals and other materials needed in the utility construction program be affected?

How will utility income hold up in the face of higher taxes and operating expenses? Can the new plant be financed cheaply?

How will the rearmament effort show up in particular regions?

What do top utility executives have to say?

ELECTRICAL WORLD's answers to these questions will be found on the following pages.

For the Rest of 1950—Boom; For 1951—Controls

Even before the Korean crisis, it was clear that 1950 would go down as a near record year for business in general and the electric utility industry. In the first half-year, gross national product—the value of all business done in the nation—was at a $267 billion annual rate, 3% above 1949. Sales of electric power began exceeding all records in January and continue to reach new highs. For the second half-year, statistics will read even better. Business spending on new plant and equipment is scheduled to rise at least 5% from the first half total. Consumer plans to buy automobiles, homes and electric appliances, as tabulated by the Federal Reserve Board, are as high as last year. And actual purchases will run substantially higher because of the war scare. Under these conditions, gross national product in the second half-year may range from $275 to $285 billion, even if munitions output starts up slowly.

Utility expenditures for new construction will be stepped up. With the higher construction costs, the year will stand at an all time record of around $2.6 billion for private and municipal companies alone.

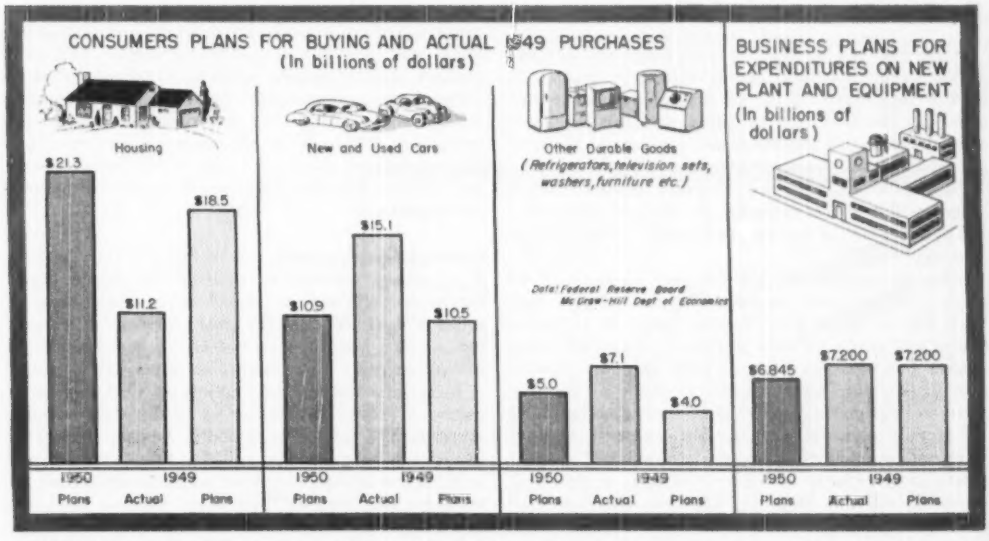
It now seems clear that home builders will complete at least 200,000 more units this year than in 1949. Electric appliance sales will top last year's total by 15% despite possible cutbacks in production caused by the rearmament program. Customers added to utility lines should approximate the 2 million annual growth of the past three years. Sales per customer will probably reach 1955 kwhr representing an all time record increase of 146 kwhr per customer.

New records are being set in production of automobiles and other consumer durables. Industrial kwhr sales are up 17% over a year ago. And production and prices are now rising in the soft goods lines, which were previously slack.

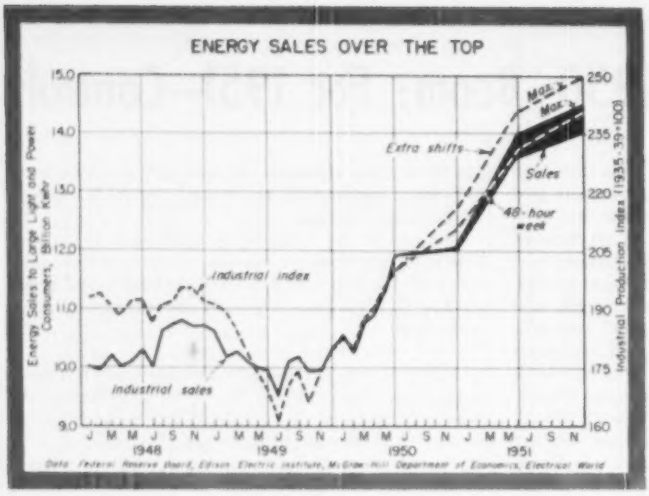
Strictly military production probably won't add much to the boom during 1950. It will be 1951 before the defense speed-up can be translated into a sharp rise in production of aircraft, ships or machine tools. But, as has already been the case, the anticipation of military demand will lead to more and more orders for things hard to get in a wartime economy.

The main effect of extra military and civilian demand will be to raise prices. Production in our basic industries cannot show a great rise overnight. The largest power consuming industries—basic metals, petroleum refining, chemicals and paper—are already operating near capacity. Because there is a limit to supplies of these basic products, and to manpower as well, total industrial production is unlikely to go much above 210 on the Federal Reserve index—up 5%—during the last half of 1950.

By the end of this year, the BLS wholesale price index is likely to be up 5 to 7% even if crops hold agricultural



SURVEYS made in the first half of 1950 showed that people intended to spend heavily on new homes, cars and electric appliances in the second half-year. In the past, actual purchases have often run higher than plans. And war scare buying makes this very likely in coming months. Similarly, business plans to increase capital expenditures have probably been accelerated



INDUSTRIAL PRODUCTION will probably increase gradually because capacity is limited. But by mid-1951 the Federal Reserve index may reach 230 if a 48-hour week is adopted. Utilities must reckon with the possibility of an all-out production effort resulting from war or near-war. Total mobilization could push industrial production to 240 by mid-1951, with a corresponding increase in power requirements

prices fairly stable. Prices of metals and construction materials will be under greatest pressure. On the average, they may rise 10%. Some items, like copper or zinc could show much greater increases. Before the year-end some price controls will probably have been applied.

Since the rate of utility buying is exceeding consumption, inventories will be much higher by the year end. Advance orders for power equipment will probably be allowed to stand even with allocation. Of course emergency orders will take precedence. Such cases might grow out of new requirements for aluminum production.

The First Six Months of '51

In the first half of 1951 the rearmament program will gather speed. Munitions output in 1950 is unlikely to require more than 3% of our steel or copper. But by mid-1951, the need may be 10%. And this will force some reductions in residential and commercial construction and output of consumers' durable goods. In specialized lines like radio and television industry, defense orders will require cutbacks in civilian production. Strict allocation of metals, particularly steel, will be necessary.

Industrial production will continue to rise. If we go to a 48-hour week, as seems likely, production may reach 230 on the Federal Reserve index by mid-year. This should produce a 17% increase in industrial power consumption over mid-1950. In large part, this must be done by applying more manpower. Some of the new plants and equipment installed in the second half of 1950 will provide increased capacity. But most of these capital expenditures will consist of modernization. Any large expansion of capacity in basic lines, such as steel and chemicals, will only be getting underway even with best conditions by early 1951.

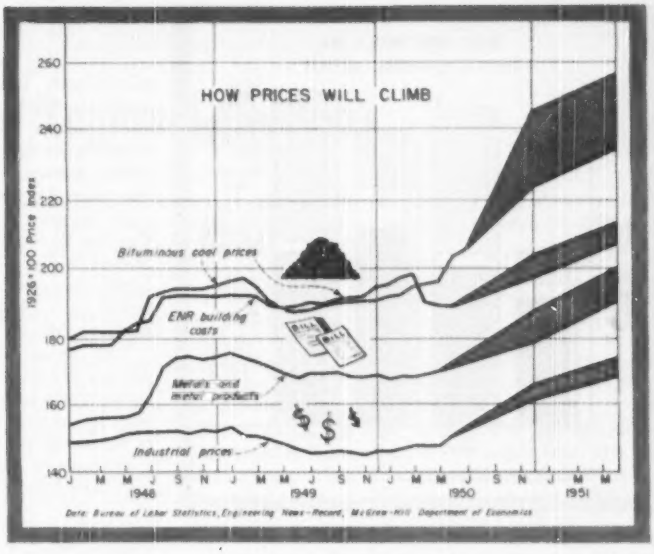
Electric utilities will face a large continuing increase in residential load. This will take place even if new home construction and electric appliance production should be cut back 10% or more in 1951. At least a 12% gain can be expected in kwhr sales. A tremendous number of homes started in the late months of 1950 will be completed early next year.

In the first half of 1951, total power output is likely to average 13% above this year's figures. This would mean continued pressure on the industry's reserve margin despite the 6 million kw additional generating capacity which will be available.

It is possible that both industrial production and industrial power requirements will be considerably higher than outlined above. If pressure of events dictates a greater speed-up in the defense program, numerous industries could go to 2 or 3-shift operations. Additional workers, mostly women, could be mobilized by direct orders from the government. Utility peak loads and new construction would not be materially affected by this increase in shift work. Load factors may go up to 64%. The chart above gives some idea of how industrial output and power requirements would be affected by such developments.

General price controls will be initiated early in 1951 if consumers continue to scramble for scarce goods. Government will move to freeze both prices and wages, as it did in World War II. The great unknowns at this writing are (1) how soon such sweeping controls will be needed, and (2) where particular prices will be held.

To a certain extent, this depends on what happens to wages. A pattern may well be set by the new steel wage contract which is to be negotiated by January. Numerous increases in wages are very likely. Few companies will want to risk strikes at a time when operations are so profitable and labor so hard to get. Unions will press hard for wage increases in anticipation of a possible wage freeze later. And whatever wage concessions basic industries grant in '51 will be reflected in the prices set for their products.



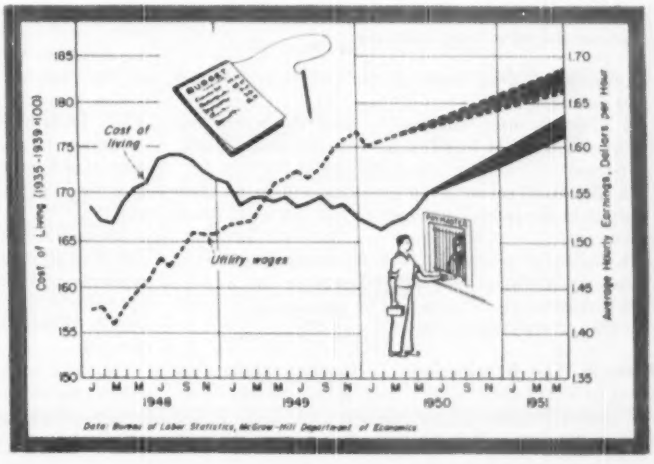
IF PRICE CONTROLS aren't applied quickly, utilities will pay more for most things they buy. Construction costs and basic metals prices are likely to increase more than costs of fuel or machinery

Prices for machinery and other metal products, including electrical equipment, will rise less than basic metal prices. The recent increases up to 10% provided for some of the potential factors. Similarly, fuel prices will be under less pressure because of the large potential supplies of coal and fuel oil.

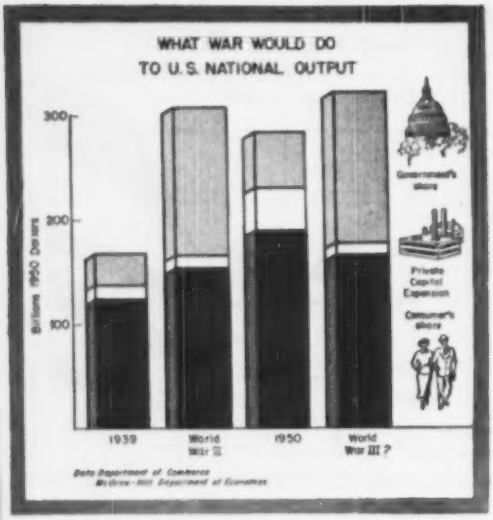
Electric utilities will be under the same pressure as other industries to raise wages. Competition for workers in tight labor areas, rising living costs and fear of wage ceilings will all be factors. The virtual certainty of high level operations and good profits will also be a union argument.

However, when utility wage contracts are negotiated in 1951, inflation is not likely to have gone very far. The cost of living may be 2% or so above its present level. But (as shown on the chart below) electric utility workers will still be well ahead of the previous year in terms of real income. Only a few other industries will have set their 1951 wage terms. The pattern will still be forming. And electric utilities will help decide that pattern.

The increase in tax rates from 38% to 45% will have a serious effect on utility earnings and financing problems, but it is believed that the expanded sales will go a long way toward offsetting the immediate problem. If an excess profits tax is applied in the same form as in World War II, it could create a serious condition unlike conditions in the last war. Construction will go on at full speed. The need for new capital will be very great and any adverse effect of taxes could cause trouble.



EVEN IF CONSUMER PRICES RISE in the next few months, utility workers will be well ahead of the cost of living. This should be an important factor in setting the general 1951 wage pattern



AN ALL-OUT WAR EFFORT would require close to half of total U.S. production. But it would take well over a year to get munitions output to this level. Government will take a third to a fourth of the national output in 1951—enough to cause shortages of metals and other materials used by utilities and electrical manufacturers—in the event an all-out war develops

During 1949-50 the utilities' earnings record stimulated investor interest in new stock offerings. But new stock may be harder to float at favorable prices in 1951 since the utilities have never been wartime market favorites. And this will certainly be the case if a drastic excess profits tax is applied to the industry.

Low interest rates for borrowed money are a sure bet to continue. The federal government will be a heavy borrower in the next year to cover the deficit caused by defense spending. So the Federal Reserve Board may be expected to support government bond prices and keep low yields on these and other high grade obligations. This will ensure the supply of low-cost capital for expansion of power and other basic industries.

In summary, then, these are the conditions that may exist by mid-1951:

1. Controls over manpower, materials, wages and prices will be fully established. Interest rates will also be pegged.

2. Wholesale prices in the meantime will be up 10% or so from the present average; critical materials, much more.

3. Industrial production will be pushing against a ceiling at 230-240 on the Federal Reserve index.

4. Industrial power sales will be running 17% ahead of 1950 and residential sales 12% to 14%.

Later in '51—New Peaks? . . . How far will the arms effort go by the end of 1951? That depends on Russia. If our present program proves adequate, the drain on the civilian economy will be no more than in the first part of the year. Industrial production will rise slowly as munitions output increases, carrying the Federal Reserve index perhaps to 240. Prices and wages will be held relatively stable by controls. We shall still have a largely civilian economy with only 25% of the national production taken by government spending.

On the other hand, if all out war develops, mobilization can be intensified. Industrial production might be pushed to 250 if the speed-up were begun fairly early in the year. And the share going for military purposes would be much greater. By the year-end, government might be taking a third of the national output.

Such an all-out effort would rapidly increase the demand for power. As shown by the chart, industrial requirements might rise to 14.5 billion kwhr per month or more by the end of 1951. And with the normal winter rise in residential use, total power requirements would present a challenge to utilities. The peak for 1951, assuming a maximum defense effort, could be as much as 12% above 1950.

Later in '51—A Letdown? . . . What will happen later in '51 if the Korean war scare blows over? Will business activity suddenly come to a jarring halt? The answer to this question is pretty clearly No. Military spending in 1951 will not be completely dependent on the course of events in the Far East. The United States has begun preparing for trouble wherever it may occur. And relatively heavy expenditures to strengthen the armed forces seem sure to continue. Moreover, a certain amount of civilian demand—particularly for durable goods—will be deferred during the first part of next year. And any let-up in military production will be partly offset by output to meet these civilian needs.

If defense requirements are reduced moderately, the second half of 1951 may be much like the first—a period of very high level business activity, with spot shortages and pressure on prices, but with more goods available for consumers and less need for controls. Industrial production, on these assumptions, might hold around 210-215 on the Federal Reserve index. And industrial power sales would continue to run 8% above 1950. Peak power requirements at the year-end would probably run 8% to 10% higher than this year.

Few people expect any letdown in the latter part of 1951. In fact, the thinking today is more in terms of expansion in military preparedness. Since the utilities must plan for the maximum rather than the minimum, a possible drop in activity will have little effect on spending in 1951.

Consumer expendable income will undoubtedly reach a peak in 1951 in spite of taxes. Therefore any let-up in production of war materials will provide capacity for appliance production. The backlog in demand should quickly absorb all of this equipment that will be manufactured.

Price and wage increases will be showing up in utility earning statements by the end of 1951. But heavy gains in sales should go a long way toward maintaining net income at a satisfactory level.

The Regional Outlook

New England . . . How will rearmament affect the regional demand for power? One way to answer that question is to see which regions now have surplus manpower or industrial capacity which can be used to increase production. New England is a good example. Its textile mills, shipyards and machinery plants can be run more hours and use more power than they have in recent months. New England has had a relatively large share of the nation's unemployment. So it's an area which may be expected to pick up with more orders for army uniforms, shipbuilding, aircraft and machine tools.

Pacific Coast . . . A similar pick-up is in progress on the Pacific Coast. This is the staging area for the Korean War. The Coast also has a big share of our aircraft and shipbuilding capacity. Unemployment has already dwindled with revived activity in these industries.

The Mountain and West North Central regions won't be greatly affected by the super-boom in manufacturing. These are primarily mining and agricultural areas. In most states the power load will be governed chiefly by continued gradual progress in farm electrification and mine mechanization.

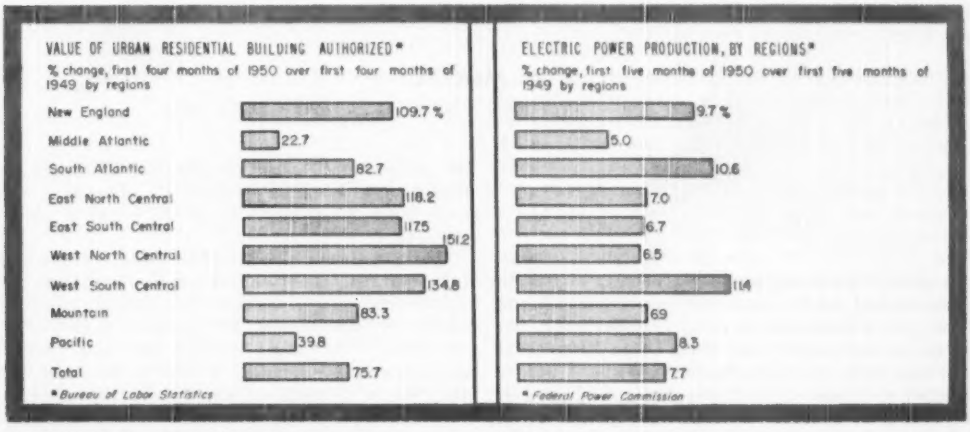
In the West South Central area, chemical, petroleum and synthetic rubber plants will call for more electricity. On the other hand, the rearmament effort will have relatively little direct effect on industry in the **East South Central** and **South Atlantic** regions. Activity will pick up a bit in the industries of the Tennessee Valley and around Birmingham. Explosives plants in Delaware, textile mills and coastal shipyards will also benefit. But little expansion will take place in agriculture or lumber products, which predominate in other Southeastern sections.

The East North Central region and in the western part of the **Middle Atlantic** region (the EEI's Central Industrial area) will carry the heaviest burden of defense orders. But the result will be only a very gradual addition to power load in this section, because plants there are already running at capacity.

For example, the steel industry will add 6% of its ingot capacity almost entirely in these states over the next 2½ years. That will call for huge amounts of power. But until the new additions are completed, the steel industry—now operating at capacity—will call for very little more electricity. Much the same considerations apply to the **Mid-West's** machinery and automotive industries, which, for a time at least, will be diverting output to the defense program rather than expanding operations.

The eastern part of the Middle-Atlantic region will feel the impact of rearmament rather slowly. New York City's light industries will not benefit directly. And metalworking plants in upstate New York, New Jersey or around Philadelphia will find it hard to expand without more steel.

Meanwhile all regions will see substantial increases in residential demand for electricity, simply on the basis of homebuilding already under way. The increase in residential construction is running strongest in the Central states, both North and South. But New England is also showing an impressive gain over last year.



ALL REGIONS show an uptrend in residential construction ..... And in electric power output

Utilities Country-wide Will

Utility management is expanding facilities for any eventuality. Higher operating costs are in prospect for 1951, but continued growth of residential and other uses will expand revenues correspondingly

C. B. McMANUS
President, GEORGIA POWER CO

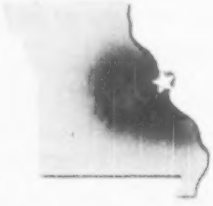
Industrial activity in this area has advanced in a rather consistent manner, with the exception of the textile mills. From the middle of 1946 through the same time in 1948, textiles increased their rate of power use from 950 million kwhr per year to some 1.1 billion kwhr per year. This rate of usage turned downward about September 1948 to the 950 million rate. Late in 1949 the rate of usage was again stepped up and appears to be headed for somewhere near the 1.1 billion kwhr mark, established in 1948. Our industrial load is more than half textile mills.

Building costs of heavy construction work, such as that involved in large steam-generating stations, high voltage transmission lines, and high tension substation construction, have been fairly firm for the past 12 months. There was a tendency for these costs to drop slightly in the latter part of 1949 due to improved efficiency of labor. During the past few months there is apparently a tendency for construction costs to go up. As a general statement, we anticipate that construction costs will probably rise 10% in this area during the next 12 months over present costs.

Operating expenses have increased over last year. This is due to increase in cost of all materials used in maintenance of our system. A recent wage increase of about 6½% will also contribute to increased operating expenses. Developments in the Far Eastern situation point towards even higher operating costs in all items pertaining to operating the properties.

The electric appliance picture looks good in Georgia. The sales for 1950 should equal or slightly surpass those of 1949, provided appliances are available in sufficient quantities. New home construction plus normal obsolescence of presently installed equipment seem to indicate a continued good market through 1951 for major appliance sales to the extent that they are available.

According to our present construction forecasts, we should have expenditures of about $15,000,000 during the last 6 months of 1950 and about $29,000,000 during the year 1951.



J. W. McAFEE
President, UNION ELECTRIC CO OF MO.

A general rise during the first six months of 1950 in manufacturing, led by metals, machinery, chemicals and shoes, plus a substantial upswing in construction, has brought industrial production in the Union Electric area to a high level. Present indications are that it will be maintained or even pushed higher during the latter half of the year. International developments will exert strong influences on our domestic economy. It is obvious that the military procurement program will be stepped up. However, we do not as yet have full information as to the extent by which this will increase industrial activity in this area.

Over-all estimates of kilowatthour sales in this area in 1950 and 1951 reflect annual increases of 6% to 7% and the total number of electric customers is expected to increase by approximately 2½% annually in each of the two years. Our budget forecasts anticipate rises of approximately 3% annually in each of the years 1950 and 1951 in kilowatthour sales to industrial customers, while residential and commercial sales, respectively, are expected to increase by about 12% and 7% annually.

Step Up Construction Programs

Average consumption per residential customer is expected to increase by about 150 kwhr annually. Although credit limitations and possible restrictions on residential building may result in some changes in our long-range residential forecasts, the momentum of the postwar building boom is expected to carry us through the next year without material revisions.

Employment is higher than a year ago, however, the general labor supply, with the exception of skilled labor in certain building lines, remains good due to the migration of workers from nearby rural areas. Wage rates have remained high and there have been no major labor disturbances in the area. However, St. Louis suppliers of automotive parts and components have been affected by shutdowns in the automobile industry. With respect to our own labor situation, the Union Electric System has recently concluded agreements with the local unions representing its workers which provide, in addition to certain fringe benefits, wage increases effective July 1, 1950, which will increase our payroll costs approximately 6%. The power plant employees' contract covers a two year period and provides for an additional increase of 5¢ per hr effective July 1, 1951.

The installations of ranges, water heaters, food freezers, television sets, automatic washers, etc, in 1950, in the Union Electric area are running substantially ahead of last year. Sales of appliance wholesalers throughout this part of the country likewise show material increases this year over 1949. On the basis of recent consumer surveys, indications point to continued favorable sales in these lines. This is also contingent upon there being no serious dislocations in the industry resulting from wartime restrictions and limitations.

The record-breaking building boom continues in the St. Louis area and over-all construction costs have increased noticeably. Shortages in skilled construction workers and certain building materials, plus advances of 40% to 50% in lumber prices within the last year appear to be the principal causes for the rise in costs. Most builders are estimating a further increase of 5% to 10% in over-all costs in the next few months.

Since the end of the last war there has been installed within our area, additional capacity totaling in the neighborhood of 160,000 kw. Installations of approximately 240,000 kw are expected to be completed before the year end and we have a 110,000-kw unit on order for 1952 delivery which should put the area in position to meet war requirements.

IRWIN L. MOORE
President, NEW ENGLAND ELECTRIC SYSTEM, BOSTON

Facing world-wide uncertainties accelerated by the Korean war, the New England Electric System is challenged to provide increasingly greater service in the five states reached by its circuits. Our postwar construction plans, now half completed, call for the expenditure of $185 million by 1952. Within our service areas are numerous industries of immediate importance to military preparedness in its broadest sense. These must and will be supplied with electricity under all foreseeable conditions within our power to meet.

Until Korea hit the front pages on June 25 we had reason to believe that our postwar expansion program would by a good margin meet expected demands through 1952. Already all New England electric utilities have a capacity margin of 23.5% above peaks. Our System's output is running weekly above a year ago by 13 to 15%. Its present generating rating is 805,260 kw. Of this, steam totals 499,890 kw and hydro 305,370 kw. Interconnections with utilities serving the eastern half of the United States are an invaluable asset to the country.

We are giving immediate attention to speeding up our System development in the face of the emergency. At this writing we cannot predict what this will amount to. We are actively analyzing possibilities through the entire property. Not much can be done to speed up our program through 1951 except perhaps to shorten some deliveries and compress by a few months' time some construction work including transmission and distribution expansion. Our sights are set on 1952 and 1953's prospective deliveries of additional capacity: Our budget is bound to increase but we cannot estimate by how much.

At this writing we have not reached the point where we can make commitments on additional capacity, but we are well aware of the importance of the time element in deliveries to be made after 1951. It is obvious that the course of hostilities will be a controlling factor in such commitments, over and above System growth of the so-

called "normal" degree. This last approximates 40,000 kw yearly, and is back of the 250,000-kw additions of our current postwar program. Our designing engineers are allowing when feasible in their plant layouts for expansion by the purchase and installation of future large units at such sites.

In 1950 we expect to see in operation the new 33,000-kw hydroelectric plant at Wilder, Vt., and a new 33,000-kw steam unit at Worcester. By the fall of 1951 completion of Salem Harbor's first unit (75,000-kw steam), and in latter 1952, the second 75,000-kw unit at this new station, will bring the system close to 1 million kw.

For the present we plan to continue all phases of load building. Sales of electrical merchandise will be pushed so far as this is obtainable under current voluntary or under official allocations of material. Emphasis on socket appliances is much in evidence. As to labor costs, agreements with unions representing over 60% of our employees have been executed with a Dec. 31, 1951, termination date. A wage increase of 2¢ per hr is subject to reopening after one year if the Massachusetts Cost of Living Index for 1950 exceeds 1949 by 5%. The course of material and construction costs depends on price level fixing policies in the main. Higher taxes loom, but we hope that a most unjust and damaging step in the way of applying an excess profits tax to the highly regulated utility industry can be avoided. Likewise, the exploitation of federal power projects in areas adequately and economically served by business-managed electric companies should be given up.

J. B. THOMAS

President, TEXAS ELECTRIC SERVICE CO

Industrial activity is at an all-time high in the service area of Texas Electric Service Co. New industrial plants of many types and increased activity of the oil industry in Scurry County and other fields in the Permian Basin area account for much of this growth.

Construction costs are again rising after a period of levelling off. For the first part of 1950, operating expenses were approximately the same as for the same period of 1949. It is expected, however, that some increases will be encountered during the later months of 1950. The effect of additional taxes will be an important factor in any change that takes place.

Our dealers report appliance sales in excess of last year and these are reflected in the growth of energy sales to our residential customers. Large numbers of homes and businesses have or are installing air conditioning and other forms of cooling equipment, and television is probably the most popular major electrical appliance in the Fort Worth area at this time. There are an estimated 15,000 sets in use in Fort Worth with 7,000 television receivers having been added during the first six months of 1950.

Since the end of the war we have added 166,000 kw of generating capacity. We have under construction one 75,000 kw unit which is expected to be in operation late in 1950 and another 75,000 kw unit and a 40,000 kw unit ordered for 1952 operation. Construction expenditures for 1950 will be about $18 million and 1951 will be approximately $10 million.

Eliminating the effects of an actual war, 1951 should see business in the Texas Electric Service Co area continue to increase at or near the high levels of the years since the war. Thousands of new homes are being completed and added to our lines this year and 1951 will represent the first full year of operation for many of them. Many more residential projects are planned for this year with 1951 completion dates.

New grocery stores, drug stores, cafes and other services are also being built to serve the expanding residential areas. At least three large office buildings in Fort Worth will be completed in 1951. Many industries are decentralizing their operations and a number of these plants are moving to Texas. New pipe lines for the transportation of petroleum products are being built and expansion programs are being carried out by several plants.

The Consolidated-Vultee Aircraft plant in Forth Worth is presently engaged in building the long range B-36 bomber and in July increased working hours to 50 per week for two shifts and added a considerable number of workers. Under the present plans for mobilization, several new camps and airfields will probably be established or older ones reactivated and oil production and transportation will be accelerated.

Construction, business activity and industrial development are expanding all over our territory and we feel that the use of electric service as well as the number of customers on our lines will continue to show substantial growth.

It is inevitable at this time that further taxes, costs of materials and supplies and other items in the cost of rendering utility service must be reflected in rates to the customer. These higher costs, government controls now operating in our business and uncertain measures in regard to price controls pose a difficult situation in the utility business at this time.

JAMES B. BLACK

President, PACIFIC GAS AND ELECTRIC CO

Unless adversely affected by the course of international events, business activity in Northern and Central California should remain at high levels during the remainder of 1950. The upward trend should also continue in 1951, perhaps at a modified pace compared with the remarkable expansion of recent years. California's population, now estimated at 10¼ millions, has approximately doubled in the last ten years. About one-half of the State's population resides in the company's fields of operations. With the rising tide of populaiton, the number of manufacturing plants and retail trade outlets in this area increased by one-third in the period from 1940 to 1949.

Residential construction since the war has been particularly active, a total of almost 54,000 new single family dwelling units having been connected to our lines in 1949. It is expected that at least this number will be connected in 1950. The outlook in this field for 1951 is presently obscured by the mobilization program.

Since 1940 the company's sales of electricity have more than doubled, increasing from 4.7 billion kwhr in that year to 10.2 billion kwhr in 1949. Sales in 1951 are expected to approximate 12.0 billion kilowatthours. Rapid expansion of electric sales has been influenced by substantial increases in average consumption as well as by the greater number of service outlets. The average annual use of the company's residential electric customers advanced from 1,027 kilowatthours in 1940 to 1,828 kw in 1949. Barring contingencies, the average consumption of our domestic customers in 1951 may exceed 2,000 kwhr.

The average annual use of electricity by our agricultural power customers in 1949 was more than double that of 1940. Much of the agricultural growth of recent years has occurred in areas of large use.

Annual power consumption by our commercial and industrial customers averaged 44% more in 1949 than in 1940. During and since the war, the trend of industrial development in this area has been strongly upward, and many millions are still being spent or planned for new or expanded production facilities.

To meet the increased service demands and to build ahead of anticipated growth, the company began to extend and enlarge its properties immediately after the close of the war. Expenditures for additions and improvements in the period from 1946 to 1949, inclusive, approximated half a billion dollars. An additional $300,000,000 will be spent in 1950 and 1951.

Aside from very substantial additions made to both electric and gas transmission and distribution facilities, this program to date has resulted in the completion of 863,000 kw of additional electric generating capacity. Plants still under construction and scheduled for completion by the middle of 1951 will add another 500,000 kw. At that time the Company will have approximately doubled its prewar electric generating capacity.

GEORGE H. BLAKE

President, PUBLIC SERVICE ELECTRIC AND GAS CO

The economy of the area of New Jersey served by Public Service Electric and Gas Co has been improving since early in the fall of 1949. Electricity used industrially has reached the highest level since the war, and due to the great diversity of industry located in New Jersey, this high level of industrial activity may be expected to continue for some time. The number of new industries locating in the area served by this company in the first five months of 1950 was approximately the same as the number which located here in the first five months of each of the years 1946 through 1949.

Sales of electrical appliances in the first five months of 1950 were slightly greater than in the first five months of 1949. Present indications are that sales of electrical appliances during the balance of 1950 will equal or exceed sales in the corresponding period of last year. The year 1950 should establish a new record for housing construction. It is to be expected that the building boom will simmer down in 1951.

At the end of 1949, the construction program of the Electric Department of Public Service Electric and Gas Co amounted to approximately $40,000,000, of which it was estimated that $25,400,000 would be expended in

FORECAST FOR '51

the year 1950 and the balance carried over to subsequent years. The construction now authorized includes the installation, at Sewaren Generating Station, of a fourth turbine-generator unit of 125,000 kw capacity, with its boiler, which is expected to be in service in the fall of 1951. At present, engineering studies of near future utility plant requirements are being made. With normal load growth, the Company would probably have to provide additional generating capacity in 1953 or 1954, but, in view of the recent change in international conditions, additional capacity will undoubtedly have to be added sooner, perhaps by 1952.

PHILIP SPORN

President, AMERICAN GAS AND ELECTRIC SERVICE CORP

Any forecast of future activity made today must be made against the background of the international situation and the war in Korea, and unless one can project the course in these two sectors correctly—a virtual impossibility—forecasting of electric power production activity in any detail likewise becomes an impossibility. One thing is certain and that is: With the use of electric energy so intimately tied in with our social-economic activities, either in war or peace, we will surely be called upon to deliver all the electric energy that we can produce.

In our system we are accelerating our present construction program as much as possible and expect to gain six months on the completion dates for the new units at the Philip Sporn Plant and the Tanners Creek Plant. Likewise, we are making plans to increase our budget and to advance the projects which we have been studying and which we have had on the boards for some time past.

ELMER L. LINDSETH

President, THE CLEVELAND ELECTRIC ILLUMINATING CO

While it is too early to appraise the full effects of the world-wide conflict between Communism and Freedom, which has brought on the shooting war between the Red aggressors and the United Nations liberators in Korea, it is obvious that this conflict is making, and will continue to make, many new demands on our national economy.

During the next few years—perhaps three, or five, or even more—a very considerable part of the nation's industrial plant is going to be engaged in the production of munitions of all types. This means that a large part of the nation's resources in materials and supplies will of necessity be diverted from the manufacture of peacetime goods to war production.

Despite the tremendous increases in the nation's industrial plant since V-J day five years ago, it is plain that the military needs of our country's armed forces and those of the United Nations cannot be supplied without curtailment of the manufacturing of civilian goods, particularly those made of critical materials. So it is evident that on the civilian front we must all prepare to tighten our belts. And it is certainly most desirable that our Federal government should tighten up on its non-military, civilian operations and expenses.

Just as our national industrial plant has far more productive capacity today than it had at the time of Pearl Harbor nearly nine years ago, so has our electric light and power industry. In fact, since V-J Day the electric industry has led all other industries in its investment in expansion and improvements.

In the case of the Cleveland-Northeast Ohio area served by The Cleveland Electric Illuminating Co, more than $700,000,000 of private capital has been invested, or committed for investment, in industrial expansion and improvements here in the 5 postwar years. In the same period the Illuminating Co has likewise invested nearly $100,000,000, and we expect to invest another $125,000,00 in the next 5 years. Our presently estimated construction expenditures for this year are $22,500,000 and for next year $20,000,000.

Last year we increased our generating capacity by 180,000 kw to 984,000 kw; next year we will add another 150,000 kw; and we are starting immediately to build our new Eastlake power plant, which will have an initial capacity of 125,000 kw and an ultimate capacity of 1,000,000 kw.

During World War II the Cleveland-Northeast Ohio area was one of the nation's three pivotal centers of war production, and the industries of the area had plenty of power, on time. There also was ample power for all other essential uses of all classifications of customers.

Provided the federal government does its part, this area will continue to have plenty of power to meet all foreseeable demands.

HIGH WATER CONDITIONS exist at Morganza Floodway for several months each year. Power line was built while area was completely dry

Methods and Equipment Geared to Terrain Build 138-kv Line Across Marshland

Settling of footings overcome with adjustable tower legs; barges used to string wire when water was high; marsh buggies transport men and materials

A. E. BEATTIE, Supt of Planning
Gulf States Utilities Co, Beaumont, Tex.

UNCONVENTIONAL — but ingenious — construction methods were needed to overcome natural obstacles during building of a 320-mile, 138-kv line across the marshes of southern Louisiana and Texas. Such diverse problems as extremely poor bearing soil, inaccessibility, frequent lightning, and pole-destroying woodpeckers were encountered and surmounted.

The line extends from Baton Rouge, La., to Lafayette, Jennings, and Lake Charles, La., to Beaumont, Dayton, Conroe and Navasota, Tex. It crosses five major rivers and the Whiskey Bay Pilot Channel, the latter being a part of the Morganza Floodway, which is 18 miles across from levee to levee. The line is now under construction and is scheduled for completion late in 1950.

Marsh and high water conditions were so severe that tower footings at the river crossings had to be unusually high, Fig 1. At the Whiskey Bay Channel, soundings showed that there was no solid bearing for 100 ft, most of it being river silt. Crossing towers at this location were built on a tripod base, with the three legs supported on independent concrete piers. Steel tower legs were fastened to the concrete through a ball and socket arrangement and fastened to a large plate which is supported on four screws, Fig 2. Should uneven settling occur this design will permit the checking up and leveling of any leg by adjusting the raise and lower nuts. This important crossing is in a territory subject to hurricanes and was specially designed to withstand winds of hurricane intensity.

Bayou crossings were all made on wood pole structures on piling. Pole heights range from 80 ft to 95 ft, with the average crossing clearance above the water about 65 ft. Span lengths on these crossings average about 600 ft.

Crossing the Morganza Floodway the line is located on an abandoned railroad dump. A portion of the rails still remains. These rails were used to assist in the construction of this line. A hole digger was mounted on a railroad motor car and used to dig holes, Fig 3. This floodway at

For pictures showing swamp techniques, turn page ➡

Building line in swamp takes ingenuity and equipment

certain periods of the year is perfectly dry, and at other times the water stands at elevations of 15 to 17 ft remaining for several months.

Salt marsh sections of the line required special structures since practically all were located on piling, ranging in length from 25 ft to 45 ft, and in many cases structures were supported by transverse and longitudinal bog logs and piling. The soil in the salt marsh will not support much weight, even the weight of a man will cause him to sink about waist deep. Pile driving rigs used for this work were made as light as possible and were moved from station to station by use of mats and skids. Fig 4.

Cypress swamps also required piling for the support of the poles, but here another complication was caused by the general large size of the stumps and their location. In the cypress swamp, trees were felled and turned to form a corduroy road on which the pile driving equipment and pole erecting equipment traveled. After the line was constructed and at the first high water these logs were floated out for salvage.

Marsh buggies, Fig 5, were used to transport men and material across marshes. This is an amphibious vehicle used in the Gulf Coast area, largely for oil exploration and other works. Boats, barges and pirogues equipped with outboard motors and regular inboard motors were used where necessary. Line truck equipment with winches was placed on barges and used for stringing conductor in the floodway under high water conditions. Fig 6.

Woodpeckers which damaged poles are a major problem in the Atchafalaya swamp. For one 18-mile stretch each pole is wrapped from the top of the pole down to a height of about 15 ft from the ground line with 19-gage hardware cloth with ¼ in. mesh. This prevents the birds from making the large holes. In order to maintain the same impulse value for these sections of the line, the pole spacing was changed to 16 ft. A 32-ft cross-arm was used, and an extra disc was added to each insulator string.

The line is primarily of H-frame construction and was designed for 366.4-Mcm ACSR phase conductors and two shield wires of 3 No. 7 EHS Copperweld. Normal spans are 650 ft, maximum span 700 ft, and normal pole length is 60 ft. Crossarms are 7 in. minimum to 10 in. maximum SYP, DF, or equal creosote 10 lb treatment. Some of the conductor installed was No. 4/0 bare hard drawn copper, due to inability to get ACSR.

Specifications for Towers Crossing Six Major Rivers

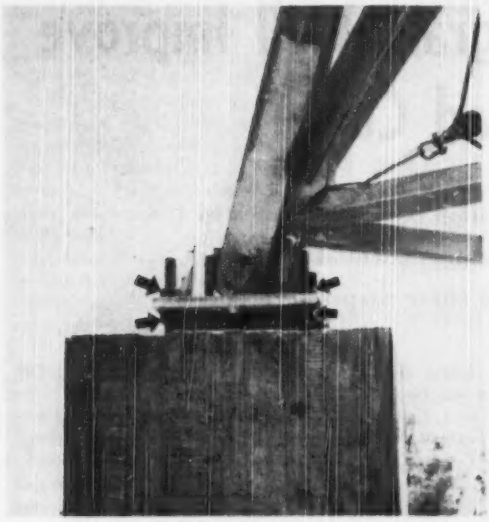
	Height of steel tower, ft	Top grade of concrete pier, ft	Span length, ft	Clearance above mean low gulf, ft
Neches River	233	15.0	800	192.8
Sabine River	203	15.5	950	150
Calcasieu River	203	17	950	152
Atchafalaya River, Whiskey Bay Pilot Channel	178	30	1200	130
Mississippi River	215	38	2000	105 (90-ft flood stage)
	425	40	3750	Sag, 184

1 TOWER FOOTINGS are set on piling and built high enough to be above flood waters at many locations. These piers are being constructed at the East Calcasieu River near Lake Charles

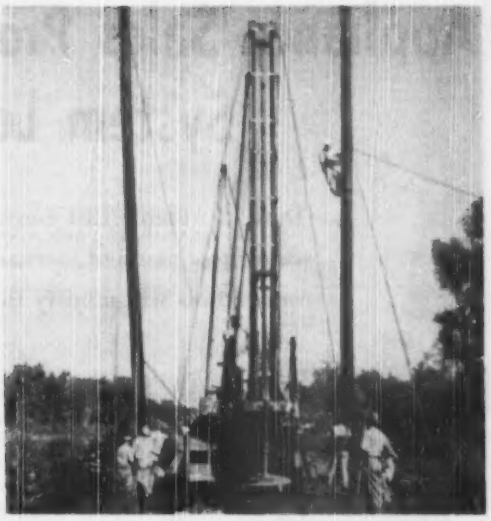
4 SLIDE SKIDS were essential to move pile drivers through salt marshes. In cypress swamps, pile driver rigs were moved over logs which later were floated out during high water periods

Many of the small streams crossed by this line carry a vast amount of barge traffic. All major rivers were crossed on steel towers and tower heights and line clearances are given in the accompanying table. Tower foundations all required piling and concrete footings which, in general, were set above flood stage of the rivers.

River crossing clearances were determined by requirements of the U. S. Engineers and by experience with broken conductors on line crossings already in existence.



2 ADJUSTABLE TOWER LEGS were provided where soil conditions make settling probable. Nuts on studs in foundation can be raised or lowered to take care of uneven settling



3 HOLE DIGGER AND A-FRAME, mounted on reinforced railway motor car, help build line along an abandoned railroad dump in the Morganza Floodway under dry conditions

5 MARSH BUGGIES moved men and material. The Sabine River is 40 ft deep at this point of crossing. Poles in the right foreground are being hauled by this vehicle

6 STEEL BARGES of standard construction carry line truck equipment with winches for hanging insulators and stringing conductor in the floodway under high water conditions

This experience, where clearances were as much as 135 ft, prompted the setting of 150 ft as a minimum clearance on new crossings subject to navigation by deep sea craft.

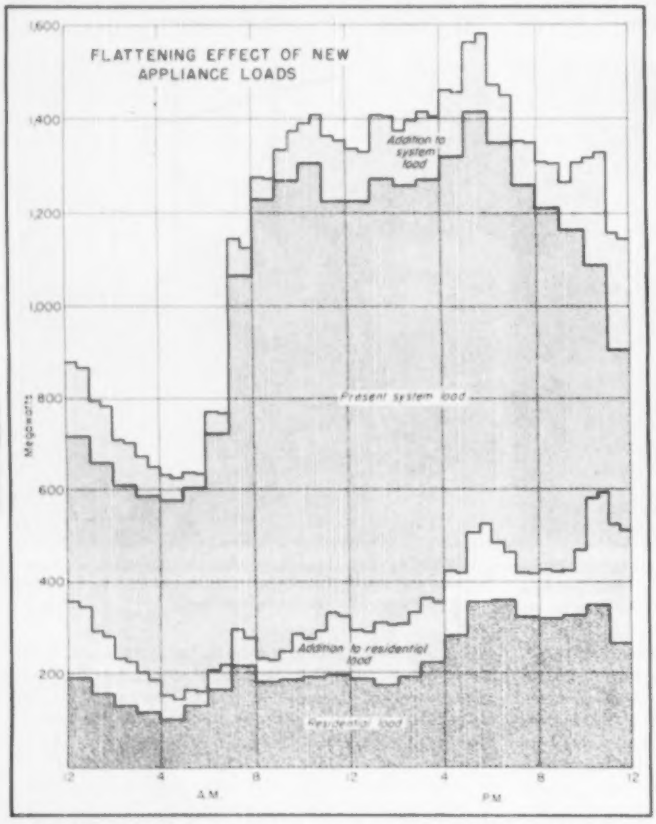
Lightning storms are very frequent in the areas traversed by the line, averaging 70 to 80 storm days a year. The line was designed for an expected outage record from lightning flashovers of one per 100 miles per yr. The section which has been in operation since July 4, 1949, has had only two tripouts: One on a perfectly clear day, after which the line was patrolled immediately by plane and it was found that a willow in the swamp had come in contact with the line; the second outage was due to a relay operation for a 69-kv fault on another line. The second outage would not have occurred had the permanent relays been installed. The line is protected by carrier current relays of the phase comparison type, backed up by three-zone distance relays with offset characteristics. In addition to the relay channel the line is equipped with three carrier channels for telemetering and one two-fre-

(*Continued on page* 194)

Appliance Sales Program Will Improve System Load Curve

Data of notable EEI convention paper developed to show how planned increases in residential appliance saturations will modify load curve shapes favorably

IN THE 1955 peak load on the system of the Detroit Edison Co, it is anticipated there will be included a block of something over 160,000-kw directly attributable to sales promotion of major appliances in the coming 5 years. This promotion is outlined in the paper, "Effect of Merchandising Programs on the Load Curve," presented by F. A. Compton, vice-president of the company, at the annual meeting of the Edison Electric Institute last June, abstracted in ELECTRICAL WORLD, June 5, 1950, and printed in full in the July, 1950, EEI Bulletin.



ADDITIONAL LOADS resulting from planned appliance sales will help to fill in valleys of the 1949 peak-day system load curve. Water heaters will cause greatest improvement

This block of 160,000 kw plus is calculated as the diversified demand at the system peak half-hour of 1,715,000 kw of connected load in major appliances expected to be sold in the 5 years. The sales expectation is comprised of 100,000 ranges, 100,000 clothes dryers, 30,000 water heaters, 300,000 television sets, and 30,000 calcinators.* As of the end of 1949, there were on the Detroit Edison system 221,000 ranges, 16,000 clothes dryers, 43,000 water heaters, 180,000 television sets, and too few calcinators to count.

This article is intended to be a sort of supplement to Mr. Compton's paper, presenting the data of it in a somewhat different way and showing graphically the effects the 5-year sales program may reasonably be expected to have on the system and residential load curves of the company.

To show these effects, the estimated half-hour values of the contemplated additional appliance loads have been superimposed on the 1949 peak-day system and residential curves included as charts A and E in the convention paper. The resulting graphs, here presented, are not to be taken as predictions of 1955 curves. They are merely intended to indicate how the expected appliance sales will modify favorably the daily shapes of the system and residential load curves of the company.

No one can tell what the 1955 load curves will look like. Their shapes

* There may be some readers to whom the word "calcinator" is strange, as it was to ELECTRICAL WORLD editors when they first saw it. A calcinator is a garbage disposer, an incinerator in effect, in which the garbage is calcinated, reduced to ash, by the application of electric heat.

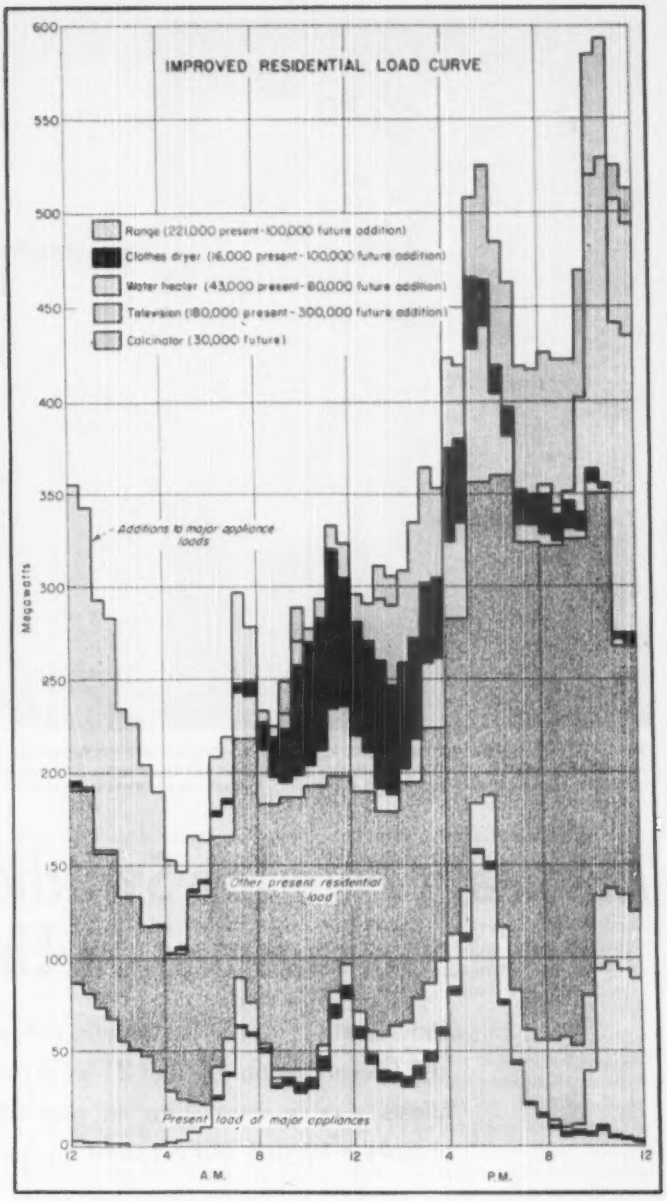
and magnitudes will depend on more factors than the additions of new major appliance loads alone. Growths in use of electricity for lighting, small appliances and probably house heating will have their effects on the residential load curve. These changes in the residential curve plus growths in industrial, commercial and other customer class loads will determine the system load curve of 1955. But it is to be seen in the graphs on these pages how the 1955 curve shapes will be improved through future additions resulting from the planned appliance sales promotion.

Of all the appliances included in the sales plan, it is obvious that the water heater will make the major improvement in the load curve because it is served off peak. Next comes television whose highest demand occurs at 9 o'clock in the evening. Following television comes the clothes dryer which has its highest demand at 11:30 AM. The three occurrences of the calcinator load also fall at off-peak hours.

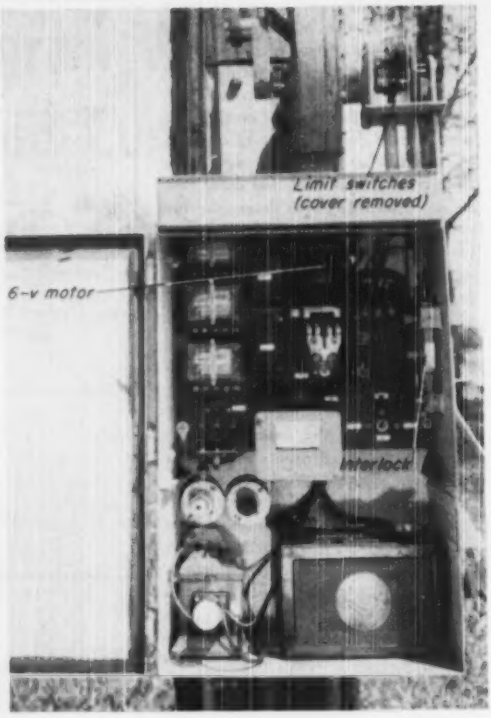
The range is the only one of the promoted appliances whose peak coincides with that of the system load. In Mr. Compton's paper it is estimated that the 100,000 ranges planned to be sold in the 5-year program will produce a revenue of $2,900,000 annually and that they will add some 83,000 kw to the system peak. On this basis —about $35 revenue per kilowatt-year—the range load is not compensatory. But just as commercial establishments find it good business to plug a "loss leader" as a means for stimulating sales of other goods, so should the electric utilities look at the range. This point is brought out in the Compton paper by evidence showing the generally much higher saturation of other appliances among range users. To quote the paper, "the range is a sales leader and in order to promote the theme of 'All-Electric Living' it appears essential that the range must be one of the first major appliances to be sold to the residential customer, and the ownership of a range will help to sell other uses of electricity."

Another consideration apart from improvement in load curve shape favors planned development of residential load. It is pointed out in the Compton paper that this load is "important because of its relative stability as a source of revenue . . . the residence revenue decreases more slowly and to a lesser extent during a depression and recovers more rapidly."

However, the stability of residential revenue would be of small moment if increase in load in this customer class were such as to require disproportionate increase in investment to serve it. Here enters the necessity for knowledge of residential load characteristics on which to base much future sales planning.



FAVORABLE MODIFICATION of residential curve through planned appliance loads. Though range peak coincides with system peak, it is a proven "All-Electric" sales tool



POLE-TOP SWITCHES are installed singly or in pairs. This one is operated by motor A, automatically controlled by three high-voltage resistors, B. There are three high-voltage arresters, C. At right, open control housing of new type mechanism shows relays, battery, battery charger, and 6-v motor. Motor circuit is interlocked with manual operating mechanism to close switch if lockout occurs

Automatic Pole-Top Switches Sectionalize Transmission Lines

Detroit utility has 31 automatic pole-top switches at 21 locations on 42- and 21-kv systems. Device allows service restoration on part of line while trouble is located and repaired on faulted section

LEONARD B. SMITH, Engineer, The Detroit Edison Co, Detroit

AUTOMATIC sectionalizing of 24- and 42-kv transmission lines is being achieved at some points on The Detroit Edison system with standard poletop switches operated by 6-v battery-powered motor mechanisms, developed and built by the Company. Switch controls at each sectionalization point are connected to the line through voltage coupling devices so that the switches operate in accordance with voltage conditions of the line and at pre-selected time sequences. A time relay controls the opening, closing and lockout characteristics. Thus the automatic operations of the switches do not interfere with the circuit breakers on the line. At present, switches are not equipped to interrupt fault current, but are timed to coordinate with operating

schedules of the line breakers. (Resistors and arresters are shown at a typical installation, opposite page.)

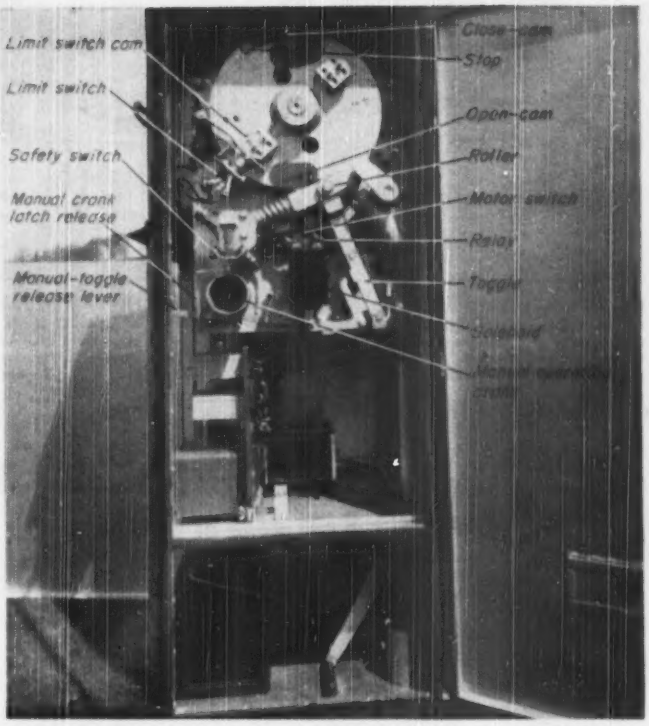
Control . . . Switches are normally used singly or in pairs. They may be operated according to any of several control schemes to provide a variety of operating sequences. For instance: A switch may be relayed to open on loss of potential, remain open, or automatically reclose on voltage restoration. Used in pairs with one switch on each side of a tap, automatic operation of one switch may be determined by the operation of the other switch of the pair, or by the voltage condition of the line connected to the second switch of the pair. The number of automatic operations causing lockout is pre-selected to suit the service application. When lockout occurs, the pole-top switch is closed electrically by manual operation of a control switch.

All automatic operating schemes provide for manual-electrical opening and closing. A manual operating handle is provided. Engagement of this handle automatically disconnects the electrical circuit to the motor thereby interlocking manual and motor operation.

Operating Mechanism . . . Two types of operating mechanisms are being used. The older style comprises an automotive starter motor, worm and worm gear drive with built-in over-running clutch. Manual operation of the switch is done by rocking the manual operating handle back and forth. By pawl engagement with the worm gear shaft this turns the crank arm of the mechanism. The worm gear is not turned by this operation because of the over-running clutch arrangement.

The new style mechanism was recently developed and approved. Its motor circuit is interlocked with the manual operating mechanism. To reduce cost and make it easy to get parts, this design uses automobile gears, starter solenoid and relay, foot dimmer switch, and the starter motor and battery.

In both types, a battery-powered motor was considered the most reliable source of power for operating the switch. The 6-v battery is continuously charged by a trickle-charger connected to a low-voltage source which, in these installations, is available. However, if a low-voltage source is not readily available, the rectifiers may be energized from the line through high-voltage resistors. Externally, these 24 and 42-kv high-voltage resistors are identical, but they differ internally with regard to resistor size.



AUTOMOTIVE PARTS are utilized, such as gears, starter solenoid and relay, foot dimmer switch, and starter motor and battery to simplify the parts replacement problem

It has been the practice to replace batteries at three-year intervals. The battery is not special and can therefore be obtained at very short notice in an emergency.

High-Voltage Couplings . . . High-voltage couplings are porcelain-clad oil-cooled resistors, sufficiently small, and light enough, to permit direct mounting on standard crossarms. These resistor devices are used at the pole-top switch location in groups of three or six per switch, depending on the operating sequence required, and are connected to dry-type rectifiers and sensitive dc relays in the automatic control. The resistor assembly includes a small vacuum-type, 500-v arrester and a protective gap, both connected to ground.

Each automatic pole-top switch installation is equipped with lightning arresters mounted with the voltage coupling resistors just below the transmission line.

Service Record . . . The Detroit Edison Co has at present 31 automatic pole-top switches at 21 locations. Seventeen are on the 42-kv system and 14 are on the 24-kv system. The operating record of lines equipped with automatic pole-top switches shows that for about two-thirds of the instances of line trouble, both circuit breakers remain closed on reclosure, the fault having cleared. In the other cases of trouble, one part of the line remains faulted, and the automatic pole-top switches sectionalize the line, permitting immediate use of the unfaulted section without waiting to locate and repair the trouble.

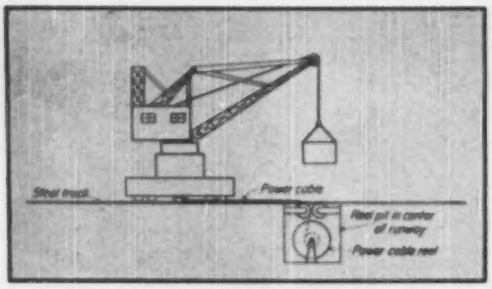


FIG 1—ELECTRIC-MOTOR-DRIVEN CRANE requires no third rail or trolley. Power is fed to crane through rubber cable between tracks. Stalled torque motor winds cable and keeps tension on cable. Crane may run an equal distance to right or left of cable reel in pit. Limit switches in reel stop crane at travel limits

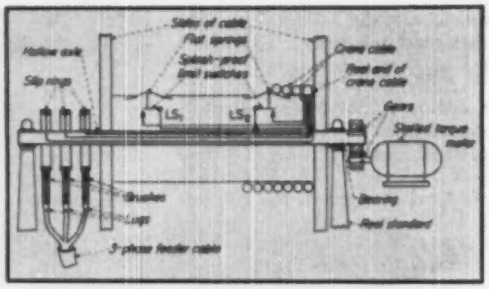


FIG 2—SCHEMATIC DIAGRAM OF CABLE REEL for crane cables. Stalled torque motor is alive at all times when crane is in use, keeps crane cable under constant tension. Limit switches de-energize crane at limits of travel, but permit freedom of operation between these limits. Reel has level wind attachment (not shown)

Cable Reel Eliminates Crane Trolley

FRANK E. REEVES
Senior Electrical Engineer
Barnard & Burk, Consulting Engineers
Baton Rouge, La.

THIS electric-motor-driven crane has the driving motor and controls, including a magnetic contactor type reversing starter, on the crane itself. Power is supplied over a 3-ph power cable. Only two control wires are needed in the cable.

The cable is not dragged in a loop, like the usual "trailing cable", but is kept taut by a "stalled torque" motor which is constantly energized. The motor is geared to the reel which is located in a pit midway between the two extremes of travel of the crane, and winds up all slack as the car approaches it. When the car is going away from it, the cable unwinds, causing the motor shaft to turn in the reverse direction. Since the motor is designed for such service, it does not overheat or draw destructive currents when it is "stalled" or reversed while energized. The pull on the cable by the motor is only enough to overcome the friction of the full length of cable when lying in its groove between the two tracks.

The limit switch circuit is an interesting one. It is of course necessary to prevent the crane from tearing the last turn of cable from the reel. The usual solution to the directional travel problem is to have a limit switch at each extremity of travel. Each limit switch ordinarily opens the control in the direction the object is traveling and simultaneously sets up the circuit for travel in the opposite direction.

The difficulty in this application is that neither the reel nor the limit switches knows in which direction the crane is traveling.

The scheme shown in Fig 3 makes use of the fact that the direction of travel of the crane is determined by the controlling push buttons. Assuming that the crane travels north when the "Forward" push button (PB_F) is actuated, and south when the "Reverse" button (PB_R) is actuated, the limit switch circuit can be set up accordingly.

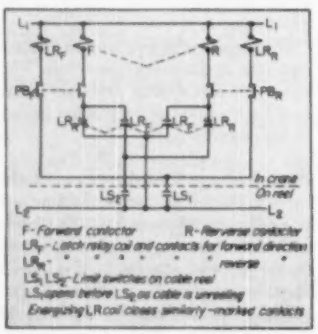


FIG 3—CRANE CONTROL DIAGRAM shown as crane is at extreme limit of travel in reverse or south direction. Latch relay is used in order that circuit may be set up by actuation of momentary pushbutton

In Fig 2, it may be seen that when the first layer of cable is on the reel, both flat springs are depressed, causing both limit switches to be closed. As the last layer of cable unreels, limit switch LS_1 opens first, and, when there are only about four turns left on the reel, LS_2 opens. The circuit must be so arranged that when LS_2 opens, the crane motor control for that direction must be de-energized, but it must be possible to operate the crane in the opposite direction.

A symmetrical mechanical-latch relay permits the circuit set up by momentary push button to remain set up after push botton is released.

The circuit in Fig 3 is shown with the crane at the extreme limit of travel in the reverse or south direction. The latch relay is set up with both LR_R contacts closed indicating that push button PB_R was actuated last. Further actuation of PB_R will have no effect. Actuation of PB_F will cause the coil F of the "Forward" or north contactor to be energized and effect movement of the crane away from its limit. When sufficient cable has been reeled to close LS_2, push button PB_R will become effective again, but will only cause closure of R contactor. Limit Switch LS_1 must be closed before the position of the latch relay can be changed, and the directional limit reversed.

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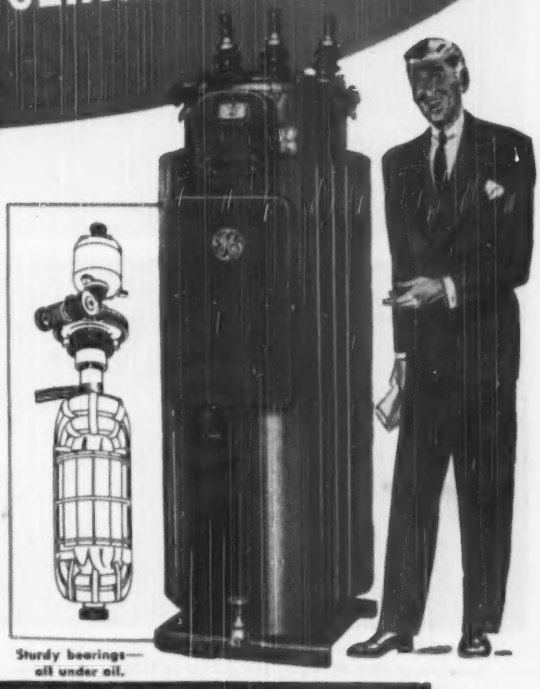
Requires Less Maintenance

than any other regulator you can buy...

GENERAL ELECTRIC IRS INDUCTION VOLTAGE REGULATOR



Sturdy bearings—all under oil.

★ **No contacts in the main circuit.**

★ **No cams or springs or elaborate gear trains.**

★ **No mechanical brake to adjust, no separate braking circuit.**

★ **Even the oil lasts longer—because the tank is sealed to stop all breathing.**

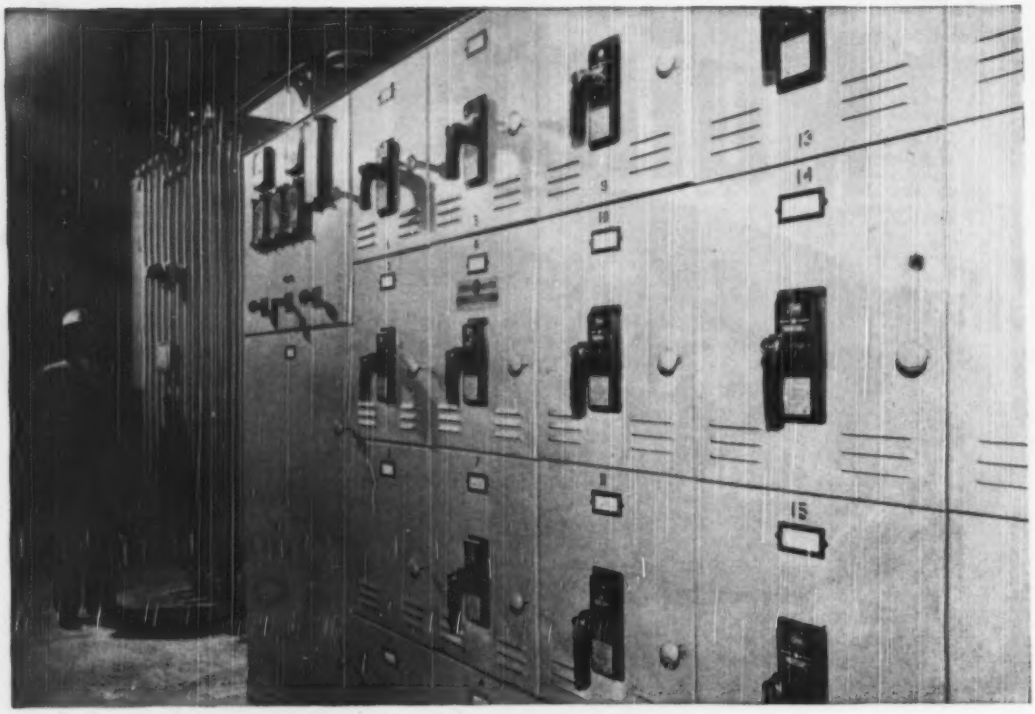
General Electric IRS induction voltage regulators give accurate, stepless regulation—with no time-delay. They respond immediately and will correct the voltage at an average rate of 1 per cent in 1½ seconds throughout the entire range of ±10% regulation.

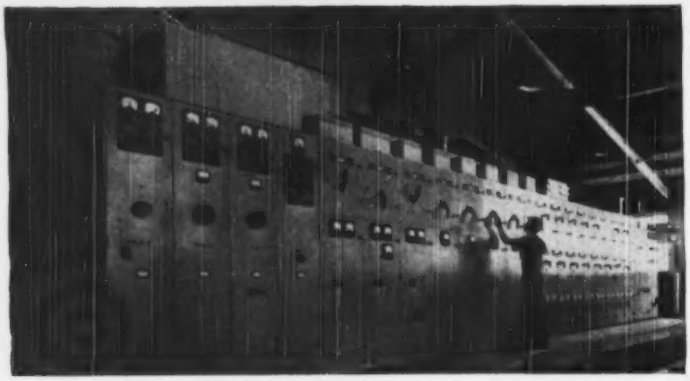
And—no other regulator can match them in low maintenance costs. Ask for Bulletin GEA-2985.

Apparatus Dept., General Electric Company, Schenectady 5, New York.

GENERAL ELECTRIC

THE NATIONAL SUPPLY COMPANY solves a 39-acre



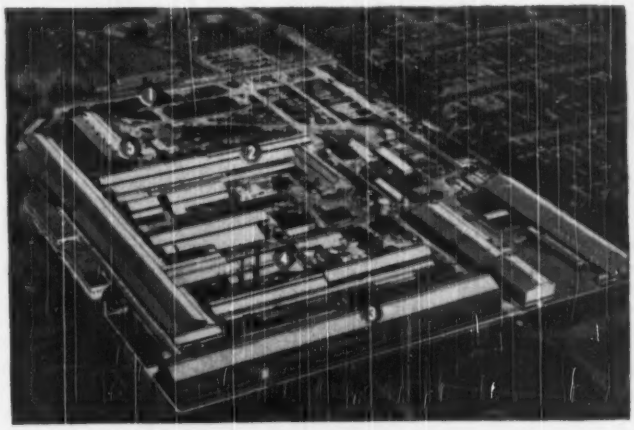


Mr. Todd of National Supply views the General Electric 1500-kva load-center unit substation located in welding shop (5 on air view, opposite page). Substation receives power at 16,500 volts and steps it down to 440 volts for distribution through 18 Type AK-1 low-voltage air circuit breakers for distribution to various welding loads. Air circuit breakers are rated 400 amperes, have 25,000 ampere interrupting capacity to adequately handle all short circuits. Note entire load-center is metal-enclosed, thus offering operating safety to personnel.

Switchgear in the main powerhouse (4 on air view, opposite page). Units at left are for protection of 2300-volt motors and are fed by 1000-kva transformer. Other cubicles contain equipment associated with DC generators and cranes, plus 24 low-voltage air circuit breakers fed by 1500-kva transformer. G-E switchgear is neat in appearance, saving in space. Additional sections can be added for future expansion with a minimum of bother and expense.

Be sure to see the "More Power to America" full-color sound slidefilm "Modern Industrial Power Distribution." Ask your G-E sales representative to arrange a showing for your organization.

power distribution problem with LOAD-CENTER UNIT SUBSTATIONS



Here's the 1600-employee Torrance plant of National Supply that manufactures heavy equipment for oil companies and mines, and precision parts for the Air Force's B-36 bomber. Total connected load is 28,000 horsepower, with all the electric power flowing underground through a General Electric power distribution system. The key to the numbers on the air view are . . .

1 Switchgear handling the 16,500-volt incoming power from Southern California Edison.

2 Electric-furnace substations: 5000, 5000 and 1500 kva.

3 Navy shafting substation: 1500 kva.

4 Powerhouse substations: 1500 kva, 440 volts; 1000 kva, 2300 volts. (See photo lower left, opposite page.)

5 Welding-shop substation: 1500 kva. (See photo upper left, opposite page.)

The National Supply installation is a complete General Electric project—one source of responsibility plus the very best in co-ordinated planning, engineering, manufacturing, and service facilities to give maximum savings and efficiency to the customer.

"Our first electrical need is versatility. We have hundreds of different machines and operations, making everything from precision parts to heavy forgings.

"We asked for—and got—a system that handles all the complexities of our plant, yet is extremely simple to operate. Simplicity on the operating end is important to a production man like myself.

"We knew we'd get reliability with G-E equipment. What really sold me, though, was the way the system met our problems . . . occupied only a small space, was installed quickly and easily, and still was flexible enough to give us all the service we needed and provide for future expansion at low cost. With its more than adequate interrupting capacity, we know our G-E system can handle anything."

Harry L. Todd, Electrical Engineer
National Supply Company
Torrance, California

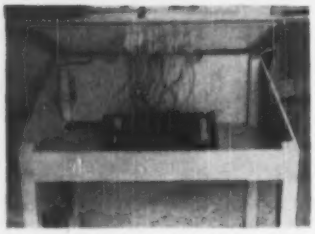
SAVE TIME by eliminating weeks spent over drawing boards detailing individual items. G-E factory-assembled unit substations are quickly and easily installed with lower material and labor costs than required for "piecemeal," makeshift affairs. No last minute "alterations" with hacksaws and cold chisels when you order G-E unit substations.

INVESTIGATE TODAY how General Electric unit substations can be used in your plant for efficient, flexible power distribution. Contact your G-E sales representative for further information, and write today for the helpful bulletins listed below. *Apparatus Department, General Electric Company, Schenectady 5, New York.*

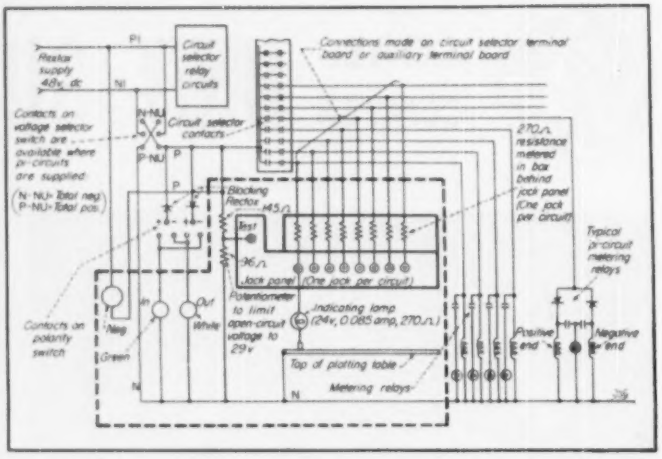
GEA-3592	Load-center Unit Substations
GEA-3758	Load-center Power Distribution
GEA-3083	Metal-clad Switchgear

GENERAL ELECTRIC

HOW TO DESIGN • CONSTRUCT OPERATE • MAINTAIN



PLOTTING TABLE in operating position (Top) has surface inclined 20 deg. (Below) Top opens to allow connections to be made



CIRCUITS between plotting table and the instrument desk and metering relays. Dotted line shows limits of plotting table. All connections from plotting table are made to instrument desk except connection in lower right corner made to metering relays.

Calculator Reading Points Indicated on Table

AC NETWORK calculator results can be plotted rapidly and directly on one-line system diagrams by using a plotting table that can be built for $750. The table was devised by Herbert P. Peters, research engineer at the Georgia Tech Engineering Experimental Station.

Points at which readings are taken on the calculator are indicated at those specific points on the superimposed system diagram by spots of high-intensity light on the plotting table. The plotting table promotes speed in reading and cuts the potential error of recording readings at wrong points. Moreover, if there should be an error, a re-reading can be taken immediately. Only 282 lamps are needed for 3,105 possible lamp locations.

Before beginning a calculator study, utility engineers plot their system diagram on specially ruled cross-section paper. Lamps to indicate reading points are located by placing the utility system diagram on the table and moving the lamps under the panel, inserting them at the desired locations. Thus, the plotting table can be set up while calculating board adjustments are being made.

Construction of Plotting Table

The plotting table is constructed from a 4x8-ft. sheet of ¼-in. plywood. The top surface is inclined 20 deg to correspond with the instrument desk slope. Working area of the table is 24x36-in. aluminum sheet drilled with ¼-in. holes every ½ in., except for a 1-in. border. Into each hole is driven a piece of ¼-in. Lucite rod, which is polished smooth at the top and bottom. Space is left underneath each rod for insertion of a lamp and holder. The bottom sheet of aluminum is drilled to correspond with the top sheet, except that holes are ⅝ in.

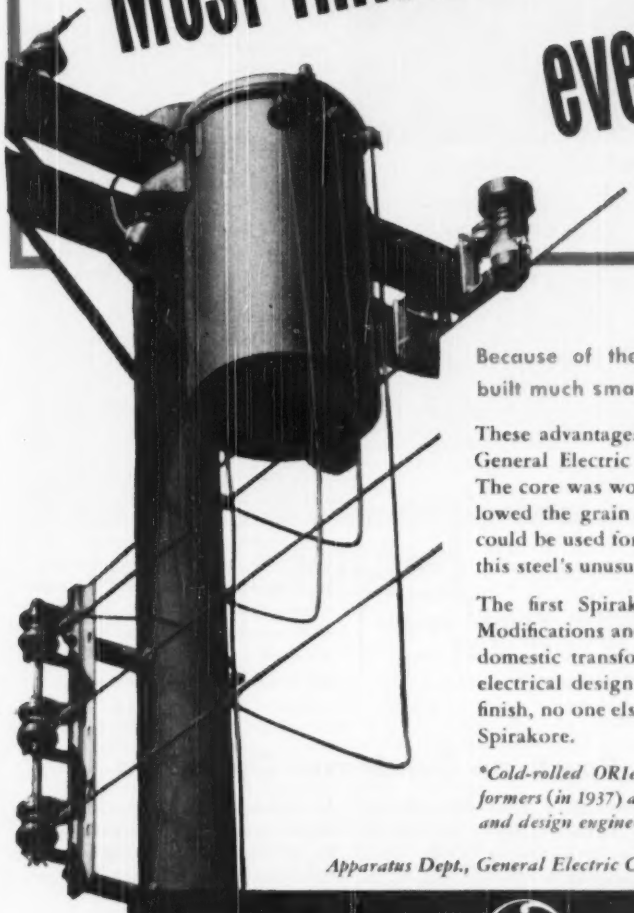
Lamps are 24-v, 0.085-amp switchboard type. Special lamp holders with spring fit are used. They are connected through a flexible cord and plug to a jack panel inside the table. One jack is required for each of the 282 metered calculator circuits. Standard banana jacks and plugs are used.

Three lamps on top of the table indicate the direction of power flow, which is always referred to the bus at which the measurement is made. White means "out", green "in", and red "negative". When reading positive-to-neutral voltage, the reading refers to the bus to which the positive end of the circuit is connected. Thus, a positive reading on the instrument is "out", and a negative reading is "in".

When the voltage switch is set to read negative-to-neutral voltage, the red lamp indicates "negative" to the plotter. The direction lamps refer to the bus to which the negative end of the circuit is connected. Thus a positive instrument reading is "in", negative "out". This reversal is accomplished through use of blocking Rectox's and requires a reversal of the dc supply polarity.

SPIRAKORE®
TRANSFORMERS

Most imitated transformer ever built



Because of the Spirakore design, transformers are built much smaller, much lighter, and lower in price.

These advantages come from a basically new idea which General Electric introduced in transformer construction. The core was wound instead of stacked. The flux path followed the grain of the steel and as a result, corisil* steel could be used for transformer cores—taking advantage of this steel's unusual magnetic properties.

The first Spirakore transformer is now 13 years old. Modifications and imitations of it are used by almost every domestic transformer builder. However, from advanced electrical design down to our unmatched Melaglyp paint finish, no one else, we believe, has even approached today's Spirakore.

**Cold-rolled ORIented SILicon steel, first introduced in transformers (in 1937) as a result of work by G-E laboratory technicians and design engineers at Pittsfield, Mass.*

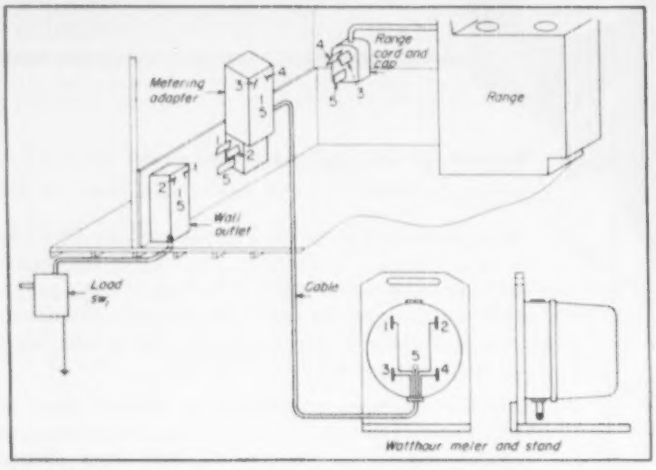
Apparatus Dept., General Electric Co., Schenectady 5, N. Y.

GENERAL ELECTRIC

Metering Adapter for Checking Range Loads

R. E. CORNELL
Boston (Mass.) Edison Co

ADAPTER, METER AND RANGE connections arranged for kilowatt-hour checkup



ADAPTER and meter setup for electric range energy consumption test

To facilitate metering electric range loads separately from the user's other services, an adapter was devised for temporarily connecting a 3-wire watt-hour meter between the range and the range outlet receptacle. The material used was a surface range outlet, a range cap (with knockouts), a 3-wire, 240-v, 15-amp socket meter, a vertical meter socket 1-in. outlet, one 1-in. socket outlet plug and 1-in. outlet bushing, one wooden meter stand, No. 8 and No. 12 flexible wire.

The surface range outlet and range cap were butted together and bolted in position so that the axis of the range cap prongs was 90 deg from that of the outlet. This was done so that the range cap section of the adapter would plug into a flush range outlet. The wiring of the adapter passes through the knockouts in the bases of the two parts and is brought out of the adapter through the knockout at the back of the range outlet section.

Four lengths of No. 8 flexible wire and one length of No. 12 were cabled and run between the adapter and the meter socket. The No. 12 was used to bond the meter socket by connecting the ground terminal of the socket and the ground neutral terminal in the adapter. A short piece of No. 8 was used to connect the two neutral terminals in the adapter. The socket was mounted on a wooden stand which was made to transport the unit as a whole and to support the meter when installed. In carrying out these tests one-third of the units installed required a cable length of 9 ft, and the rest a length of 6 ft.

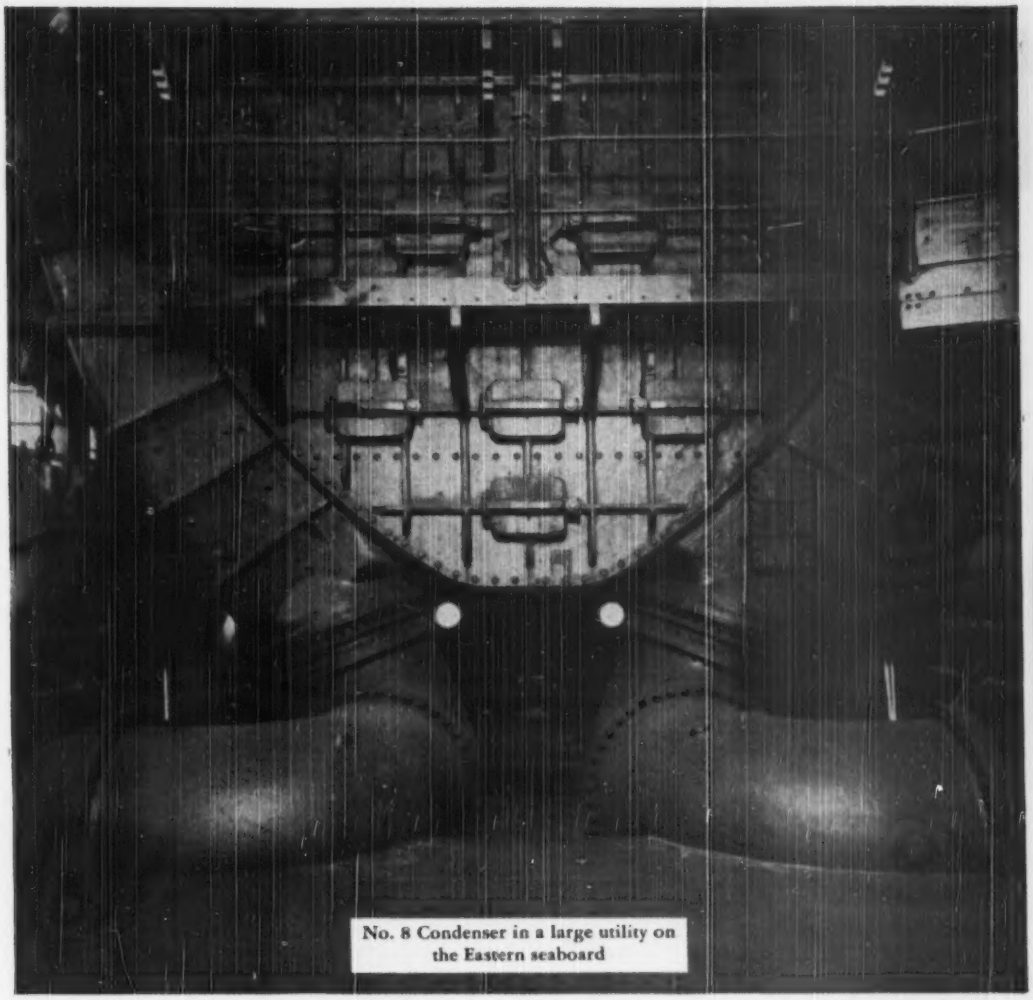
Five Maintenance Points on Condenser Operation

Several practices to keep condensers in good operating condition are employed by Consolidated Edison of New York:

1. During the summer, condenser tubes lose their heat transfer efficiency due to the algae accumulations on the water side. These accumulations have been practically eliminated by treating circulating water with chlorine.

2. Another cause of lowered efficiency is a coating inside tubes. This coating is removed with an inhibited solution of hydrochloric acid. Strength of solution varies between 0.5% and 2% and is determined for each condenser by preliminary tests made on one or several tubes removed for cleaning. Both sides of the condenser are cleaned with the same acid, but solution strength may vary, as determined in accordance with preliminary tests.

3. Most depreciation in condenser tubes occurs within 6 in. of the inlet, where erosion and cavitation take their toll. New as well as old installa-



No. 8 Condenser in a large utility on the Eastern seaboard

don't let FOULING get your figures ALL FOULED UP!

● One important factor taken into account when figuring on the heat-transfer capacity of a condenser is fouling. But the effect of the tube alloy on both rate and amount of fouling is sometimes ignored in design calculations. The acceptance test of a condenser is made with clean tubes. However, the average heat transfer rate varies with time, and fouling is the chief factor in such variation. In many applications this indicates the need for serious consideration of cupro-nickel tubes, which are recognized to have superior anti-fouling characteristics, as well as high resistance to corrosion, erosion, impingement. Thus it can be said that cupro-nickel, 30%, will provide more uniform transfer rates over a period of time, require cleaning much less often, and last longer . . . Revere makes condenser tubes in cupro-nickel as well as in all the other customary copper alloys. We will gladly collaborate with you in a study of the economics of condenser tube selection to meet your needs for true economy. Write for reprint of article entitled "What Factors Should You Consider in Selecting Condenser-Tube Alloys?"

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

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Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N.Y.— Sales Offices in Principal Cities, Distributors Everywhere.

MOLONEY TR

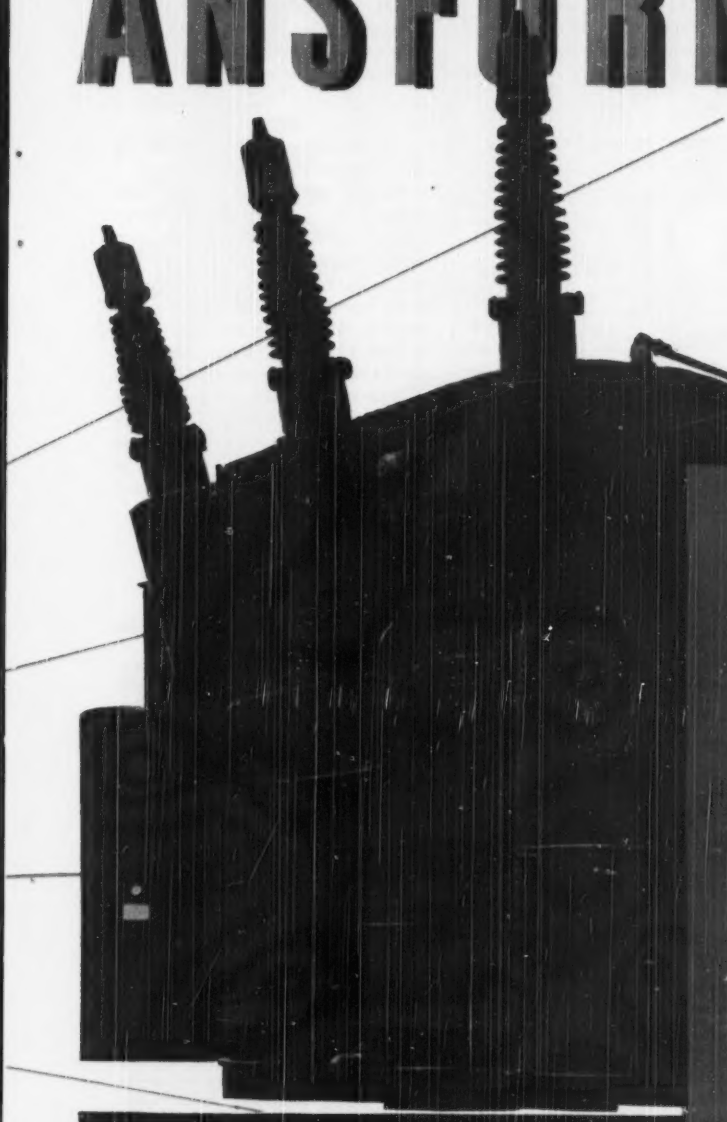
...all sizes in all voltages up to and including 230,000 volts

Moloney manufactures all types of transformers for Power System and Industrial applications. They are built in all Kva sizes . . . in voltages as low as 240 volts and as high as 230,000 volts.

Whatever your requirements are . . . Moloney can supply you with transformers of unsurpassed quality. The experience of over half a century of transformer manufacture...a policy of incorporating a high factor of safety in design . . . the use of highly skilled workmen in a plant noted for its low labor turnover . . . all combine to provide the traditionally high quality of Moloney Transformers.

Leadership in **DESIGN • RESEARCH • ENGINEERING**

ANSFORMERS



MOLONEY MAKES

POWER TRANSFORMERS

UNIT SUBSTATIONS

TAP CHANGING UNDER LOAD TRANSFORMERS

STEP VOLTAGE REGULATORS

REGULATING TRANSFORMERS

HIPERCORE DISTRIBUTION TRANSFORMERS (Conventional and CSP Types)

LOAD CENTER TRANSFORMERS

ASKAREL (Non-Inflammable Liquid) COOLED TRANSFORMERS

AIR-COOLED (Class A and Class B Insulated) TRANSFORMERS

CONSTANT CURRENT STREET LIGHTING TRANSFORMERS

SUBMERSIBLE TYPE TRANSFORMERS

NETWORK TRANSFORMERS

MOLONEY ELECTRIC CO.

Power and Distribution Transformers Exclusively Since 1896

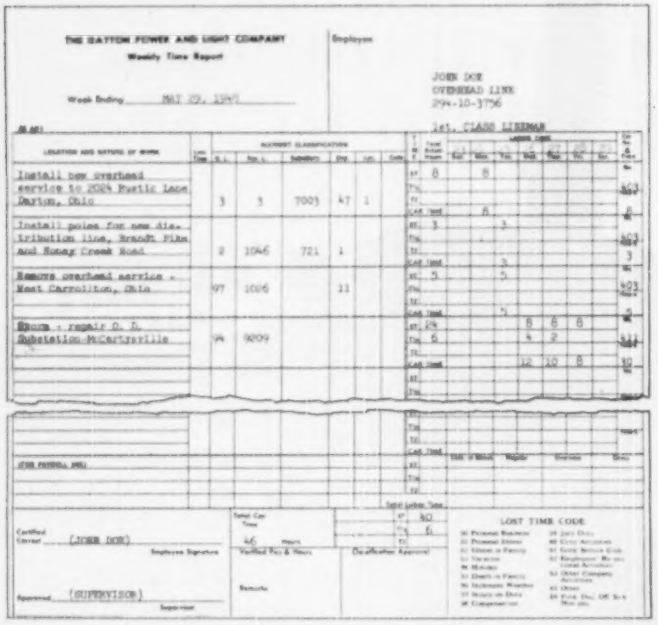
FACTORIES AT ST. LOUIS 20, MISSOURI AND TORONTO, ONTARIO, CANADA

tions are protected at tube inlet end for a distance of 5 to 8 in. by a coating of protective (Dehecote) cement.

4. On tubes where inlet ends are worn, metal and fiber inserts, or plain metal inserts, varying in length from 5 to 12 in. may be installed. Metal and fiber inserts are secured by swelling action end of fiber. Plain metal inserts are bound with protective cement.

5. With the advent of aluminum brass or aluminum bronze tubes, it is felt that tube life expectancy may be 20 to 30 years, three times that of Admiralty tubes. But this metallurgic improvement can be voided by premature deterioration of inlet ends.

• • •



THE DAYTON POWER AND LIGHT COMPANY
Weekly Time Report

Employee
JOHN DOE
OVERHEAD LINE
299-10-3756

Week Ending MAY 20, 1950

Job Cl. CLASS LINEMAN

LOCATION AND DETAILS OF WORK	ACCOUNT CLASSIFICATION						Total Hours	LABOR TIME						Inc. & Time
	Loc.							Sat.	Mon.	Tue.	Wed.	Thu.	Fri.	
Install new overhead service to 2024 Poetic Lane Dayton, Ohio	3	3	7003	47	1		8		8					8
Install poles for new distribution line, Brandt Pike and Stony Creek Road	2	1046	721	1			3			3				3
Remove overhead service - West Carrollton, Ohio	97	1005		11			5			5				5
Storm - repair O. T. Substation-McCartysville	94	9009					18				6	6	6	18
							12				4	2		6
							12					12	10	8	30

Certified Correct (JOHN DOE) Employee Signature

Approved (SUPERVISOR) Supervisor

Total Car Time 46 Hours

Verified Pay & Hours

Classification Approved

Remarks

LOST TIME CODE

FORM for machine accounting reports labor and car time, reduces accounting expense and makes information more readily available

Cut Reporting Costs on Labor, Cars

S. J. SCHIML
Supervisor General Accounting Dept
The Dayton Power and Light Co
Dayton

IN CONNECTION with The Dayton Power and Light Company's over-all study of accounting procedures a weekly time report form was devised. This form (shown) was designed for use in machine accounting procedures and to simultaneously provide the basic information required for four purposes:

1. To report, on one weekly form, the number of hours worked daily by each individual employee for payroll computing purposes;

2. To report, on one weekly form, the number of hours of transportation equipment usage, by car number, and by the individual using the car;

3. To provide an accurate accounting medium for accumulating data regarding non-productive payroll costs such as vacation, illness pay, holidays, deaths, personal business, civic duties, etc;

4. To accomplish accurate accounting distribution for all these costs.

Experience so far, going by the employment of the weekly time report, leads to the conclusion that the number of accounting papers has been reduced by at least 80% when compared to the former daily reporting system. This represents important cost savings throughout from a form compilation viewpoint only and eliminates the volume of detail paper work represented by more than 3½ tons of paper annually.

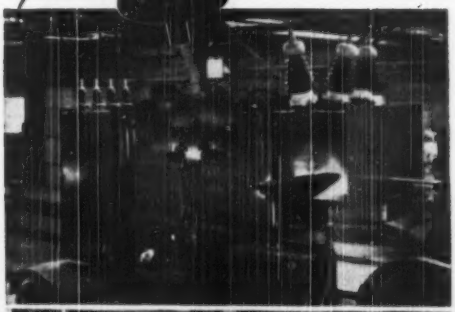
Further substantial savings were realized in payroll accounting by eliminating daily transcriptions from time sheets to weekly control records. Since usage of transportation equipment logically follows labor operations in determining accounting distribution, the new form practically gave a savings of approximately 90% in time spent in such accounting. As a by-product of the new form a complete analysis of non-productive time is readily available, while formerly it was obtained only at great effort and expense, if at all.

•

Drainage Pipe Makes Suitable Hand Hole

STANDARD SECTION of concrete drainage or sewer pipe makes an excellent hand hole for pulling and splicing underground cable—also for providing a convenient and accessible location for insulating transformers for airport runway and taxiway lights. Pipe is set in the ground so that its bell end is flush with the surface. Direct burial type cables enter it from beneath. Gravel in the bottom and underneath each hand hole insures better drainage. Hand hole top is made of cast concrete and has a flush handle. Because top will not withstand weight of large plane, pipes are not installed in paved areas. Picture shows installation at Boston's Logan Airport where hand holes are used to serve controlled-beam type high-intensity runway lights installed off the runways in the stabilized shoulders. Consulting engineer for this project was Eugene Groden of Boston

Meeting a wide variety of primary and secondary voltages, a necessary part of an efficient portable unit substation, this interesting piece of equipment has been manufactured by Pennsylvania Transformer Company for an eastern utility company. Its electrical combinations are described as follows . . . . "Rating, 1000 kva. High voltage, 11, 22, 33 and 44 kv. Low voltage, 2400/4160 Y, 4800/8320 Y, 7200/12470 Y, three phase, 60-cycle, 55 degree C. rise. And, as added assurance of reliability, equipped with . . ."



BUSHINGS

ONE OF THE FINEST COMPONENTS OF ANY TRANSFORMER

Ohio Brass

MANSFIELD • OHIO

How To Determine Temperature Range For Gas-Oil Sealed Transformers

C. L. SIDWAY, Electrical and Mechanical Engineer, Southern California Edison Co, Los Angeles, Calif.

Method has been developed to calculate the range of operating temperature through which inert-gas oil-sealed transformers can operate without taking in air or exhausting gas. Calculations are made from the dimensions of the transformer and expansion tank, and nameplate data

TO FIND SEALED TEMPERATURE RANGE

Assumptions

a. Volume of gas in the transformer and expansion tank varies inversely with its absolute pressure and directly with the absolute temperature.
b. Temperature of the oil and gas are the same for all values of temperature.
c. Effect of pressure on the volume of gas absorbed by the transformer oil is negligible.
d. Volume of oil in the expansion tank is constant.
e. Formula for the expansion of transformer oil is:

$$O = O_o (1 + \alpha t)$$

where: O = oil volume at any temperature
O_o = oil volume at 0 C.
$\alpha = 0.0008$ = coefficient of expansion of transf. oil
t = temperature in degrees Centigrade

f. Pressure due to a 1-in. head of oil = 0.0324 psi.

Let:

O = oil volume in main tank, cu in.
G = gas space in main tank, cu in.
g = gas space in expansion tank, cu in.
Δ = change of temperature, degrees C from 0 C to blow-off; or sealed temperature range
P = absolute pressure of gas in gas space
T = absolute temperature of gas and oil
V = volume of gas, cu in.
Subscript o indicates values at 0 C.
Subscript 2 indicates values at blow-off, i.e., maximum sealed temperature.

Calculations:

$$\text{Given } \frac{P_o V_o}{T_o} = \frac{P_2 V_2}{T_2} \quad (1)$$

$$\text{Hence, } T_2 = T_o \frac{P_2}{P_o} \times \frac{V_2}{V_o} \quad (2)$$

$$\text{Let, } V_o = G_o + g_o \quad (3)$$

$$\text{and } V_2 = G_2 = (G_o - \alpha O_o \Delta + g_2) \quad (4)$$

i.e. the gas space in the main tank minus the change of oil volume for a change of Δ C plus the gas space in the expansion tank at the final temperature.

Substitute in Eq 2

$$T_2 = T_o \times \frac{P_2}{P_o} \times \frac{(G_o + g_2 - \alpha O_o \Delta)}{(G_o + g_o)}$$

But $T_2 = T_o + \Delta$

$$\text{So } \Delta + T_o = T_o \times \frac{P_2}{P_o} \times \frac{(G_o + g_2 - \alpha O_o \Delta)}{(G_o + g_o)}$$

Solve for

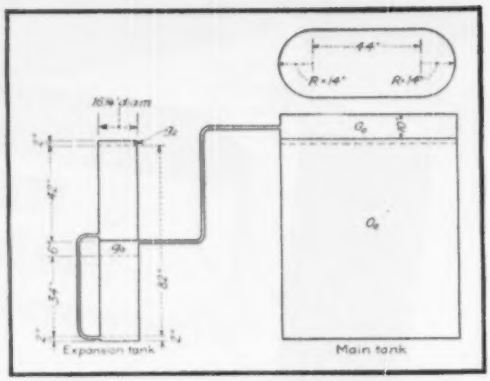
$$\Delta = T_o \frac{\left[\frac{P_2}{P_o}(G_o + g_2) - (G_o + g_o)\right]}{(G_o + g_2) + T_o \frac{P_2}{P_o}(\alpha O_o)}$$

EXAMPLE

Given: A 1,500-kva transformer with tank data shown.
Find: Sealed temperature range for transformer.

Solution:

1. Oil volume main tank at 25 C = O_{25} = 775 gal
= 775 × 231 = 179,000 cu in.



2. Using main tank dimensions.
Area = (44 × 28) + (π28²/4)
= 1,265 + 615 = 1,880 sq in.
3. Distance from top of tank to 25 C oil level = 10 in. (assumed)
4. Gas volume main tank at 25 C = G_{25}
= 10 in. × 1,880
= 18,800 cu in.
5. Oil volume main tank at 0 C = $O_o = O_{25}/(1+0.0008\times25)$
= $O_{25}/1.02$ = 179,000/1.02
= 175,490 cu in.
6. Gas volume main tank at 0 C = G_o
= (O_{25} − O_o) + 18,800
= (3,510 + 18,800)
= 22,310 cu in.
7. Expansion tank area = π16.25²/4 = 207 sq in.
8. Gas volume expansion tank at 0 C = g_o
= 6 in. × 207
= 1,242 cu in.
9. Gas volume expansion tank at blow-off = g_2
= 207 × 36 = 7,452 cu in.
10. Gas pressure at 0 C = P_o = 14.7 psi
11. Gas pressure at blow-off = P_2
= 14.7 + (9.0324 × 82 in.)
= 14.7 + 2.66 = 17.36 psi
12. P_2/P_o = (17.36/14.7) = 1.181

Tabulating:

T_o = 273	$(G_o + g_o)$ = 23,552
G_o = 22,310	$(G_o + g_2)$ = 29,762
g_o = 1,242	P_2/P_o = 1.181
g_2 = 7,452	O_o = 175,490
P_o = 14.7	α = 0.0008
P_2 = 17.4	

Then $P_2/P_o\,(G_o + g_2)$ = 1.181 (29,762) = 35,149
And $T_o \times P_2/P_o \times \alpha O_o$ = (273 × 1.181 ×[0.0008]× 175,490)
= 45,260

Solving for

$$\Delta = 273 \times \frac{(35{,}149 - 23{,}552)}{(29{,}762 + 45{,}260)}$$

$$= 273 \times \frac{11{,}597}{75{,}022} = 273 \times 0.1546 = 42.2 \text{ C}$$

. . . and General Electric's Anti-Bulbsnatching Drive is getting underway!

STARTING SEPT. 18

A POWERFUL SALES IDEA!

General Electric's Anti-Bulbsnatching Drive is timed for the peak of the lamp buying season—right when the nights are getting longer. It features the greatest lamp-selling idea ever—*bulbsnatching*—General Electric's famous name for robbing one light socket to fill another!

PLENTY OF ADS TO PUT IT OVER!

Customers will see and hear about the Anti-Bulbsnatching Drive again and again. Full color ads in Post, Life, Look, and Sunday newspaper supplements. Ad messages on spot radio and the Fred Waring Television Show. All will work to help keep light sockets filled.

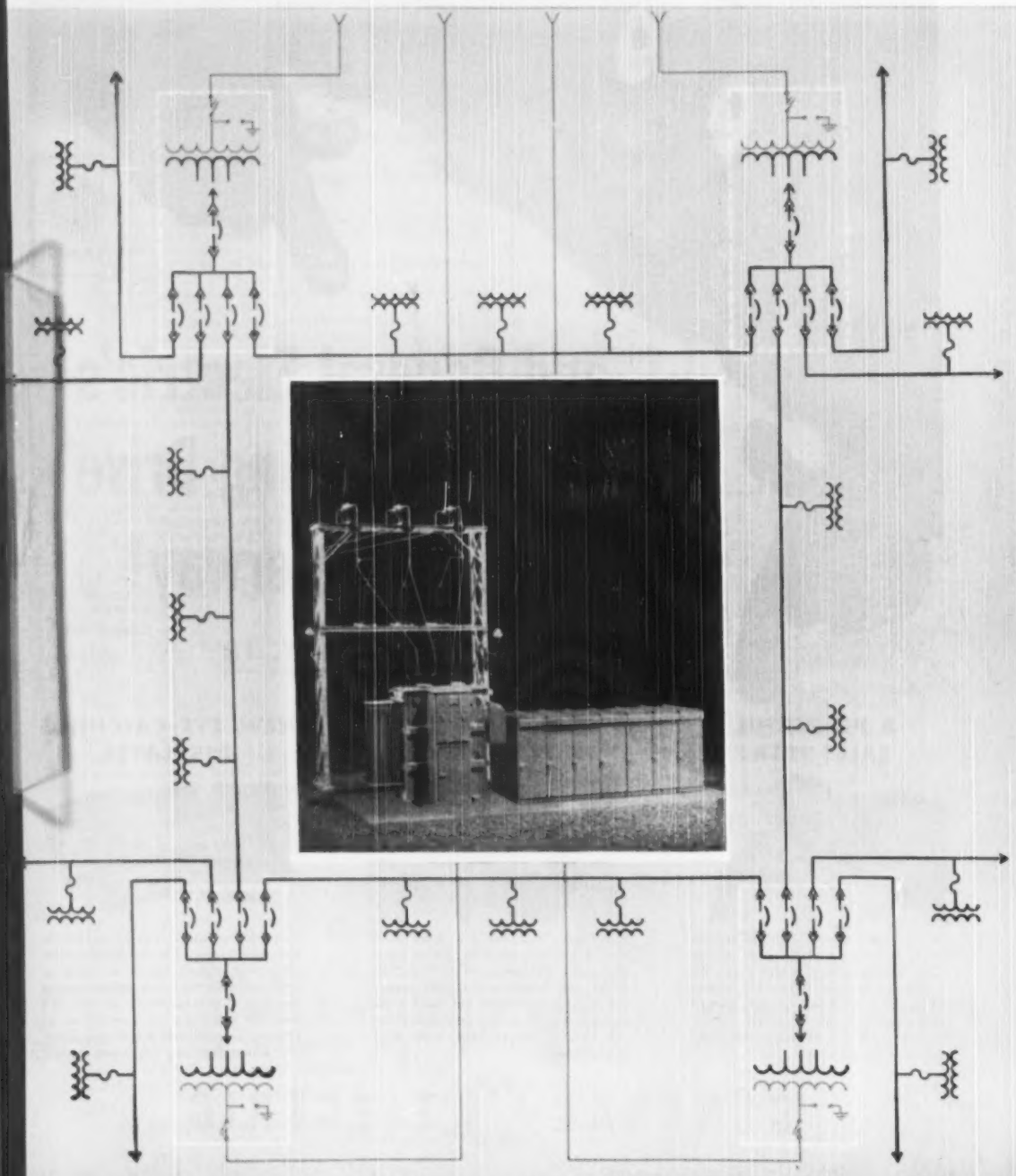
NEW, EYE-CATCHING DISPLAYS!

Colorful counter cards, window streamer, carton tuck-ins, special price cards will urge customers to stock up on lamp bulbs for every socket during the Anti-Bulbsnatching Drive. It's another example of how General Electric is constantly promoting more and better lighting for every home.

GENERAL ELECTRIC

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



Co-ordinated Substation of the Primary Network type energized from a single subtransmission circuit.

CO-ORDINATED SUBSTATIONS

Help Simplify Systems *and* Lower Power Distribution Costs

The substations you choose *now* will become vital tools in building simplified systems . . . *and* lowering power distribution costs; therefore, *their inherent design must provide for these factors.*

The Westinghouse Co-ordinated Substation, shown here, is one example. It is a compact standardized unit designed to economically answer Primary Network requirements. It is completely co-ordinated from incoming line facilities to outgoing feeders.

This relatively small, bus-regulated substation, and its associated system, economically simplify many distribution problems. Individual feeder regulation is eliminated. Fewer high-voltage breakers are required. The cost of switching on the subtransmission side of the station is reduced. Unitized construction provides flexibility for meeting future load requirements. Transformers and breakers can be quickly de-energized for maintenance . . . without service interruption.

As you plan for the future and gradually simplify your system, be sure you have considered the benefits of Westinghouse Co-ordinated Substations. Their part in long-range power distribution economies has been carefully considered in every phase of their design and construction. More information is given in Booklet B-4061. Ask your Westinghouse representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60729-A

Westinghouse

COORDINATED SUBSTATIONS

WESTINGHOUSE

Properties of Mica Insulation

Table lists insulating characteristics of composite mica in the forms of sheets and tapes

Adapted from "A Survey of Electrical Insulation Practices," by M. A. Faucett, C. Hoagie, and G. E. Leininger; Circular Series No. 37, published by The Engineering Experiment Station, University of Illinois, Urbana, Ill.

TABLE contains numerical values (in light type) wherever possible. Also a relative value (in bold-face type) of the property with respect to the other materials is assigned, based on a rating system. Rating of 1 indicates that the material designated is deemed most desirable for the property named. The accompanying ratings 1 to 10 are based on opinions reported by industrial users and should be considered in the light of ratings for other insulating materials reported in two preceding installments.

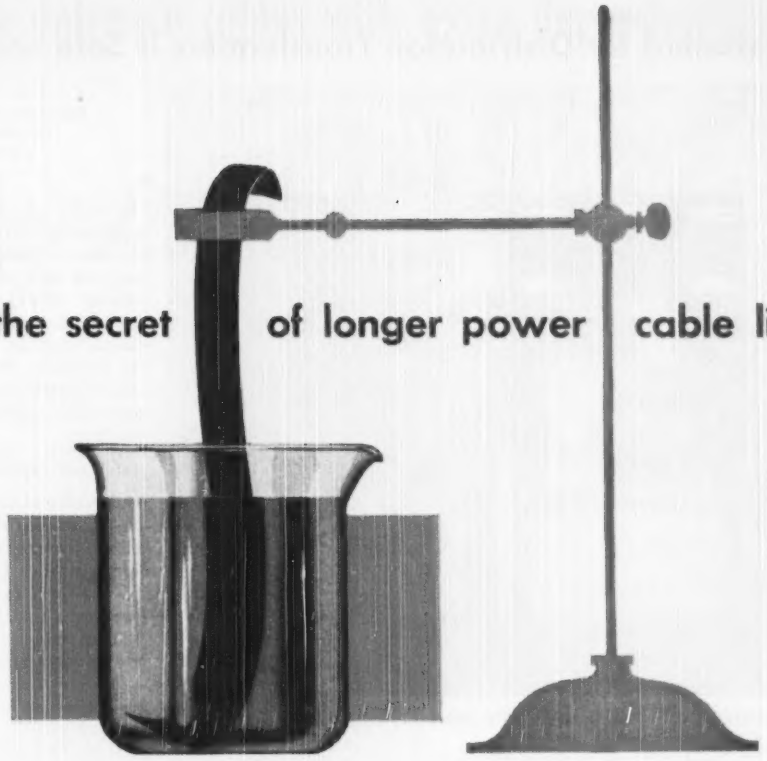
COMPOSITE MICA SHEETS AND TAPES

Material	Dielectric Strength, vpm	Thickness, mils	Abrasion (resistance to)	Flexure (life under)	Creasing (resistance to)	Tear (resistance to)	Tensile (Breaking) Strength, lb./in. width	Maximum Operating Temperature, deg C	Thermal Aging	Heat Conductivity	Resistance to*				
											Moisture	Oil	Acid	Base	Solvent
Conventional Varnish—Backed With:															
Jap Paper	(7)	3.0 to 6.0	**8-9**	**5-9**	**7-10**	**7-8**	**8**	(9) **5** 105	**4-8**	**8**	**8**	**6**	**9**		**8**
Jap Paper Rope Paper	(7)	3.0 to 6.0	**6-9**	**5-9**	**6-10**	**7**	**7**	(9) **5** 105	**4-8**	**8**	**8**	**6**	**9**		**8**
Jap Paper Rope Paper	(7)	(8)	(8)	(8)	(8)	(8)		(9)		(10)					
Jap Paper Fish Paper	(7)	10.0 to 12.0	**8**	**7**	**4**	**5**	**5**	(9) **4**	**6**	(10)					
Jap Paper Cotton	(7)	5.5 to 7.5	**6**	**2**	**5**	**6**	**6**	(9) **4**	**5**	(10)					
Jap Paper Rayon	(7)	5.0	**7**	**1**	**5**	**4**	**4**	(9) **4**	**5**	(10)					
Jap Paper Glass	(7)	5.5 to 8.0	**4**	**3**	**2**	**2**	wrp. 65 fil. 35	(9) **3**	**4**	(10)					
Backing Material, Using Organic Varnish:															
Cellophane		5.0 to 15.0	**9**	**5**	**8**	**9**	**5**	**6** 105							
Glass(1)	900-1000	4.0 to 11.5	**3**	**3-4**	**3-9**	**3**	wrp. 65 fil. 35	**2** 130	**2**	**7**	**2**	**2**	**3**	**3**	**4**
Glass(2) Glass	1000-1191	6.0 to 15.0	**1-5**	**2-3**	**1-9**	**1-3**	wrp. 100 fil. 70	**2** 130	**2**	**7**	**2**	**2**	**3**	**3**	**4**
Asbestos(3) Reflexite		60.0 to 125.0	**5-8**	**6-9**	**6-9**	**8**	**9**	**3** 130	**2-3**	**9**	**6**	**7**	**9**		**9**
Silicone Varnished—Backed With:															
Glass(4)	1000	3.5	**5**	**4**	**9**	**3**	wrp. 40	180	**1-2**	**9**	**2**	**10**	**5**		**9**
Glass(5)	400-600	3.4 to 7.5	**3-5**	**3-4**	**3-9**	**3**	wrp. 40 to 65 fil. 10 to 35	**1** 180+	**1-2**	**9**	**2**	**10**	**5**		**9**
Glass Glass	400-700	9.5 to 15.0	**1-5**	**1-3**	**1-8**	**1-3**	wrp. 90 to 100 fil. 60 to 70	**1** 180+	**1-2**	**9**	**2**	**10**	**5**		**9**
Asbestos(6) Asbestos (paper form) Unbacked Mica	500	60.0 to 125.0	**8-9**	**8-9**	**6-8**	**8-9**	**9**	**1** 180+	**1-4**	**9**	**5**	**10**	**5**		**9**
Mica Sheet Hand built	700	7.0 to 30.0	**10**	**9**	**10**	**9**	**9**	**1** 180+	**2**						
Machine built	500	5.0 to 15.0	**10**	**10**	**9**	**10**	**10**	**1** 180+	**2**						
Uncut Mica Segment mica-shellac Block mica	1000 1500	1.0	**3** **4**	**9** **9**	**10** **10**	**2**		180+ 180	**2** **1**	**7** **5**	**4** **2**	**2** **2**	**6** **2**	**9** **3**	**5*** **1**

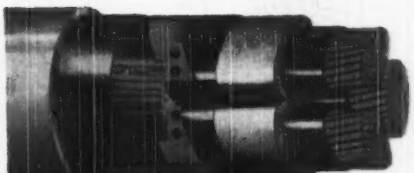
* No resistance to alcohol. For the last two types of material in this part of the chart, these characteristics are dependent on the type of treatment applied to the covering materials rather than on the base covering fabric or the type of binder employed.

1—Basis for rating: 0.002 in. treated cloth, 0.004 in. mica . . . 2 Basis for rating: 0.002 in. untreated cloth, 0.004 in. mica, 0.002 in. treated cloth . . . 3—Machine-built mica center .008-0.015 in. thick . . . 4—Tape, backed one side only . . . 5—Treated paper one side . . . 6—Machine-built mica center . . . 7—Dielectric strength depends on quality of mica used, and how much (Approximately 300 to 500 vpm) . . . 8—Jap and rope papers may be used interchangeably . . . 9—Limited by decomposition (char) temperature of paper . . . 10—No appreciable difference.

Here's the secret of longer power cable life–



Carbon Black *tape gives you a power cable construction—developed by Anaconda after many years of research testing—that greatly lengthens the life span of impregnated-paper-insulated power cable.*



Carbon Black constantly purifies the impregnating oil . . . keeps it clean . . . stabilizes it to prevent deterioration caused by high heat and electrical stress . . . removes oxidation products from the insulation and eliminates ionization discharges.

Now, *CB** plus F-3** (the alloy-lead sheath amazingly resistant to slow-bending fatigue, creep, burst, abrasion, vibration and aging) offer you the best power cable you can buy—in design, construction, performance, long life and economy—ANACONDA *Type CB (Carbon Black) Power Cable.* Get *all* the facts today at your nearest Anaconda Sales Office. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

*CB—Carbon Black (U. S. Patent 2,102,129) Reg. U. S. Pat. Off.

**F-3—Arsenic-Lead Alloy (U. S. Patents 2,300,788 and 2,374,755) Reg. U. S. Pat. Off.

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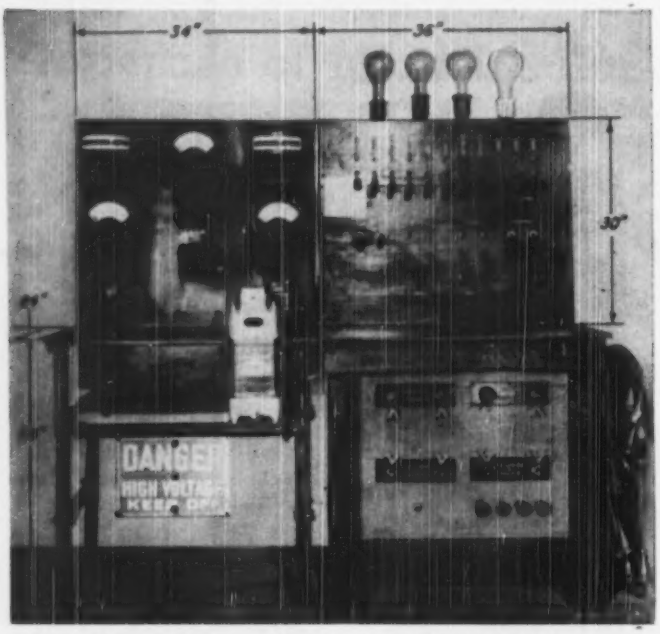
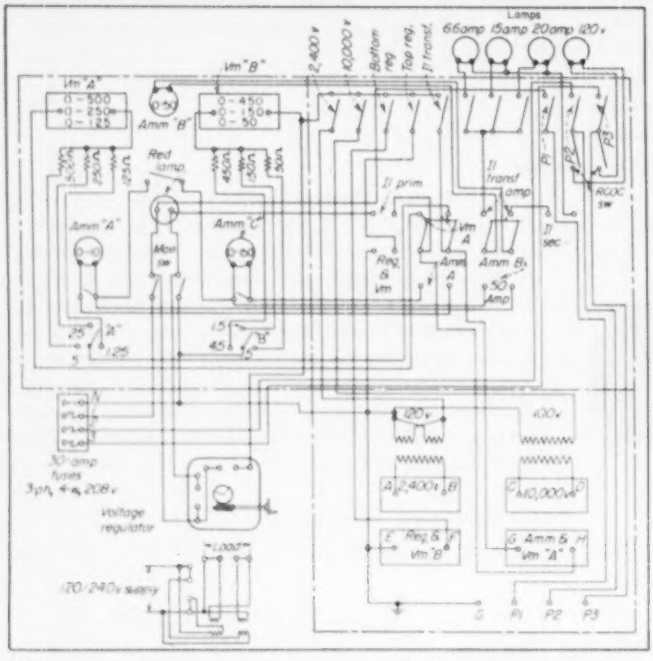


TRANSFORMER and distribution equipment testboard with over-all dimensions



TESTBOARD for distribution and IL transformers eliminates connecting instruments for each test. Terminals G, P1, P2, P3 used for testing RCOC switches and 1-ph or 3-ph motors

Testing of various distribution equipments with a special test-board enables an operator to perform the required tests safely, efficiently and quickly. The board, designed and built by the author, is located in the Canton electrical repair shop. Since the board has been in use, the time saved in testing distribution transformers alone is estimated to be 250 hr per year.

No More Instrument Reconnecting

Maintained by substation personnel, the shop is responsible for testing, overhauling and repairing equipment such as line transformers, RCOC switches and IL transformers. Previously, testing of this equipment required considerable time because various voltmeters, ammeters, etc, had to be connected for each test. There was also a continuous hazard involved with the use of jumpers between the instruments.

Testboard Components

Principal components of the testboard include a 3 kva, 2,400–120-v distribution transformer, a 200-va, 10,000–100-v potential transformer, and a 0.5% boost induction voltage regulator rated at 1 kva. With the exception of these components and a few small items from stock, the majority of other material was obtained from either scrap or available obsolete equipment.

Safety Measures

Safety features of this testboard include a red indicating light, mounted above the main switch, which glows when the main switch is closed. Box insulators cover the terminals on the lower right panel and prevent the operator from accidentally touching the live terminals. When the testboard is in use barriers are placed around the immediate test area to prevent unauthorized persons from contacting the energized equipment. The tester stands on a rubber mat at all times, and, as a further precaution, wears rubber gloves.

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from every angle

there's a good reason for choosing the

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C50-121

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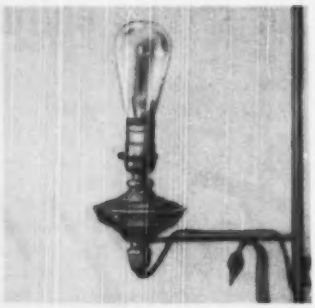
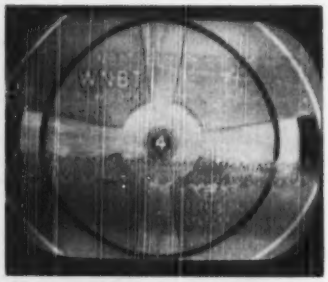


FILAMENT LAMP of the Mazda B type has been found to be a notable offender in the production of TV interference



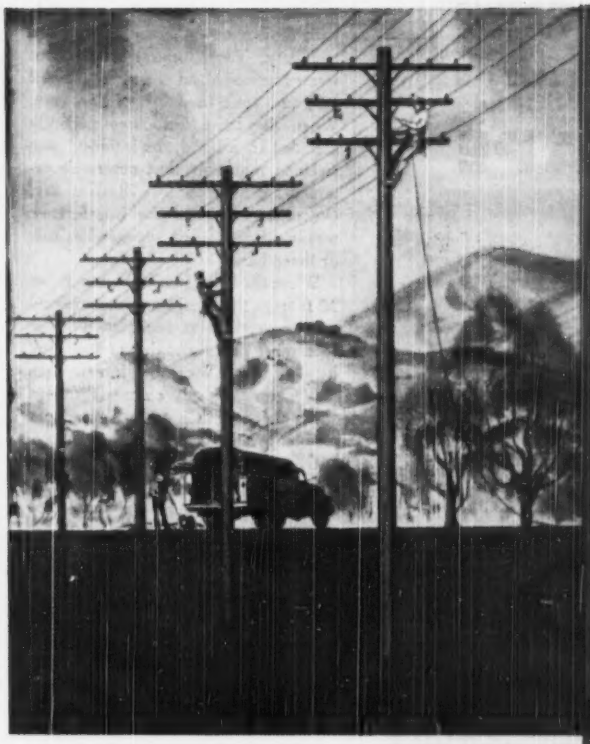
TV INTERFERENCE produced by Mazda B lamp mounted 2 ft from chassis. Lamp was shielded by a hand held over it, reducing intensity though interference remained

Filament Lamps Produce TV Interference

TV-INTERFERENCE from a lamp in good working order has been tracked down by several service and utility groups, one of the first such groups being the Communications Committee of the Pennsylvania Electric Association. This group found that the Mazda B lamp, an old type containing straight-wire filament in the form of a cage supported on a glass post, was a notable offender. TV service organizations have detected similar interference from modern inside-frosted bulbs.

To study these effects, the editors of "Electronics" conducted a test. A Mazda B lamp known to cause interference was installed in an open holder about 2 ft from a television chassis. Lamp and receiver were fed from the same outlet.

Interference was found to take the form of one or more horizontal bars, covering from 3 to 50 lines of the image (corresponding to interference pulses of 200 to 3,000 microseconds duration). Pulses of interference are



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PENTA protection is *clean* protection—permits a *full length* preservative treatment with no fear of complaint from customers or line crews. PENTA gives long lasting *proved* protection against decay and termites. Its remarkably low solubility and volatility mean it stays in the wood under the most adverse conditions.

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★ New York—WALTER E. DAW ASSOC. 1155 Oswego Blvd., Syracuse
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★ Ohio—THE OHIO RUBBER CO. 725 St. Clair Ave., Cleveland
Penn.—J. Y. MEAGARTY & CO. Liberty Tr. Bldg., Philadelphia
Texas—WYNNE SNOOTS CO. 705 E. 13½ Avenue, Houston
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Virginia—W. E. EPPERSON 406 Travelers Bldg., Richmond
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* ACCURATE SPECIFICATION TAPES—Rubber and Friction—exceed ASTM designations: D119-48T and D69-48T.

WRITE FOR FREE SIX PAGE FOLDER — Your copy is now ready. Fully describes the Accurate quality line of standard and specification friction and rubber tapes. Please write on company letterhead to ACCURATE MANUFACTURING CO., GARFIELD, N. J.

ACCURATE TAPE

synchronous, as is to be expected, with the frequency of the local power company. The strongest interference was experienced on channel 4 (66-72 mc) and took the form of two bars. When the lamp bulb was partially shielded by a hand, the intensity was reduced markedly, but otherwise retained its character (see illustration). On other channels the interference was less intense and appeared as one or three bars.

When the lamp was moved to about 20 ft from the receiver and connected to a separate outlet (connected to the receiver outlet through the fuse box by 40 ft of BX cable), interference disappeared on all channels except channel 4, and then only one bar was visible.

One possible explanation of this interference is thermal vibration, causing the filament wire to make intermittent contact with its supports. If intermittent contact time is brief, the resonant circuit formed by the wire receives a brief pulse of excitation from the power line once each cycle. Lamps of the type shown are known to be still in use, particularly in rural districts. They are most often found in attics and cellars.

BUS BAR PROTECTOR fits over energized bus bars to protect against accidental contact with grounded metal. It consists of two sections of ½-in. plywood which slide together around bus bars. Area of cutout portion is variable from 5x5 in. to 5x15 in.

Shield Prevents Grounds On Service Entrance Bus

GEORGE YEZBICK
The Detroit Edison Co

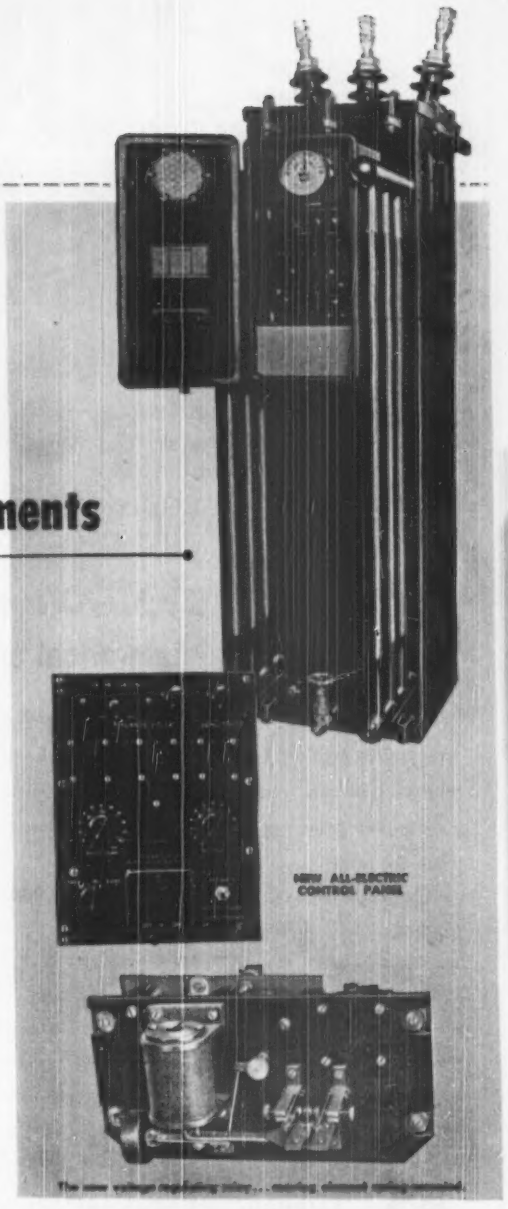
To PREVENT accidental grounds when pliers, wrenches or other tools slip during work on energized low

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

More Dependable Regulation

without **Mechanical Adjustments**



Easier to operate!
Greater freedom from maintenance problems!
The new Westinghouse Induction Regulators give even more dependable regulation, with an all-electric control that eliminates mechanical adjustments.

All-electric control . . . easy to adjust:
Balance voltage and band width are determined by position of calibrated knobs and tap plug. That's all there is to it. Adjustments may be made without disturbing the line-drop compensator; either setting may be changed without interrupting service.

Rugged spring mounting eliminates delicate bearings:
Here's a nuisance maintenance problem licked! No more risk of trouble from mechanical bearings.

Spring-mounted . . . snap-action elements:
Motor operating relay has all moving parts spring-mounted, arranged to eliminate all armature impact . . . assures long life.

"Lifetime" contacts:
Another maintenance headache cured! Heavy silver contacts are designed to last the life of the unit.

Available in three models to meet all urban station requirements. Type SU, oil cooled. Type SA, air cooled. Type SI, Inerteen (R) cooled. For further information, ask your Westinghouse representative for a copy of B-4736, *Westinghouse Voltage Regulators for Urban Substations*, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.
J-10351-A

Westinghouse
VOLTAGE REGULATORS
for **ANY** system

Approved Protection for oil filled electrical equipment

Fire damage to transformers can seriously curtail plant operations and result in high cost equipment losses and out-of-service time. That's why you'll be using good judgment when you make sure that your oil filled power generating equipment is safe from fire 24 hours a day, every day of the year.

You can get this protection by specifying *Automatic* FIRE-FOG, for when fire breaks out, FIRE-FOG goes into action instantly . . . automatically . . . stops the fire quickly and surely.

Specifically designed for your particular risk, *Automatic* FIRE-FOG is electrically safe and carries the approval of all leading insurance authorities.

Better get in touch with an *Automatic Sprinkler* fire protection engineer for details on FIRE-FOG and other types of fire extinguishing systems. Name your hazard—we'll protect it!

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA
YOUNGSTOWN 1, OHIO

"Automatic" Sprinkler

FIRST IN FIRE PROTECTION

DEVELOPMENT . ENGINEERING MANUFACTURE . INSTALLATION

OFFICES IN PRINCIPAL CITIES OF NORTH AND SOUTH AMERICA

voltage service entrance bus bars, a two-section protector was designed to fit over the extending bars. The protector will fit all common sizes of channels and variously spaced bus bar service entrances, having an opening that is variable from 5x5 in. to 5x15 in.

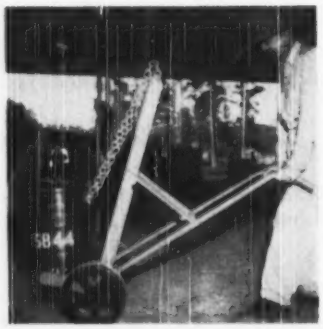
Quickly Installed or Removed

This protector can be installed or removed readily. Installation consists of loosening two wing nuts and sliding the sections apart. Sections are then brought together snug against each side of the bus bars and wing nuts tightened.

The protector is constructed from ½-in. marine plywood and impregnated with paraffin. Heads of bolts are countersunk, with wooden plugs inserted to protect wing nut and bolt from being grounded.

Protection between phases can be secured by covering the phases adjacent to the one being worked on with rubber blankets. A light-weight, small rubber blanket is very convenient for this purpose.

Move Transformers Quickly With Modified Hand Truck



MODIFICATION of a standard hand truck has simplified the handling of small transformers for the Houston Lighting & Power Co. The change consisted of welding two large angle irons to the truck and bracing them with smaller angles welded to truck handles. A chain has been attached to the top of one of the large angles. The other angle iron has a slot at the top to receive the free end of the chain. In operation, the truck is positioned so that ends of the curved strap base are around the transformer. The chain is slipped under the transformer ear and the free end is slipped into the slot in the angle iron. The transformer is lifted by tilting the truck. Because line trucks back to loading platforms, transformers from storage can be picked up and wheeled directly into the truck to keep down intermediate handling.

WHEREVER YOU USE WOOD..

IN THE DESERT, crossties broom, shatter and split from extreme dryness and heat. Solutions made with BARRETT* Coal-Tar Creosote retard this, and also reduce mechanical wear of crossties through their lubricating action on the wood fibers. In poles, heavy treatment with BARRETT Coal-Tar Creosote substantially reduces checking and splitting.

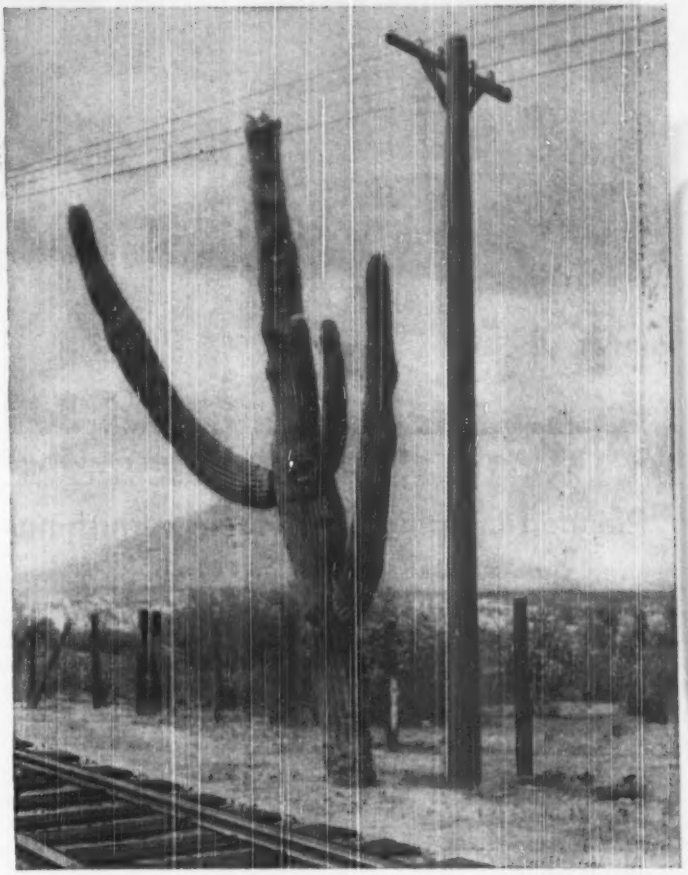
IN THE NORTH, poles must resist the tremendous weight of frequent sleet storms. Avoid preservatives which *weaken* the wood. BARRETT Coal-Tar Creosote allows poles to retain their maximum strength, and helps to keep the poles at their best and hold the lines aloft.

IN THE SOUTH, prolonged high temperatures cause light-bodied preservatives to leach and evaporate from the wood, thus exposing the wood to termite attack and decay. BARRETT Coal-Tar Creosote, heavier bodied and of lower volatility, prevents this condition. It stays in the wood longer under all conditions—doesn't "run out" on the job.

IN THE SWAMPS, forces of decay are almost at their maximum of destructive power. High moisture content and infection from other decaying wood and debris are ever-present menaces. Poles properly treated with BARRETT Coal-Tar Creosote have survived under swamp conditions for years.

IN FRESH WATER, many preservatives leach out of wood. BARRETT Coal-Tar Creosote resists this leaching action. Being only negligibly soluble in water, it is the preferred preservative for use on submerged wood structures, or those exposed to the powerful action of rapidly flowing water.

IN SALT WATER, marine wood-borers give a preservative its severest test. Of hundreds of preservatives that have been tried through the years, *Coal-Tar* Creosote is the only one that has proved consistently effective against teredos, limnoria and other salt-water enemies of wood.



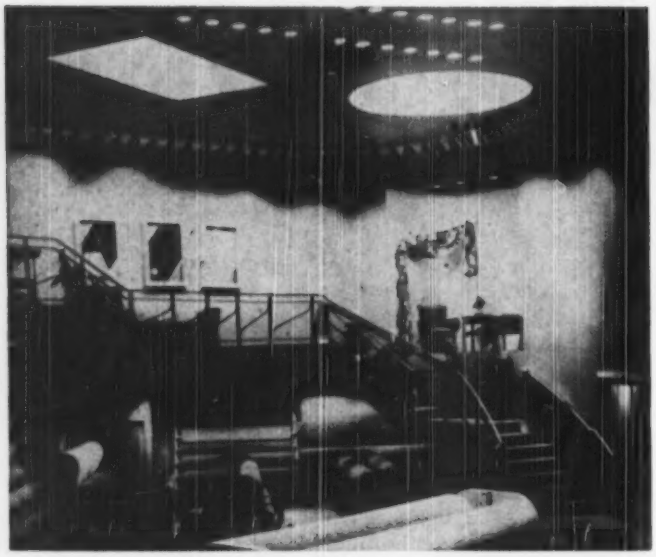
THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

Use Barrett®

*Reg. U. S. Pat. Off.

Only coal-tar creosote wood preservative has been used long enough and widely enough to have proved its effectiveness under all conditions.

COAL TAR CREOSOTE



STAGE SETTING effect of back wall is visible from street through glass store front

Planned Lighting Sells Home Furnishings

CLIFFORD MILLER
Consolidated Edison Co of N. Y., Inc

VERSATILITY of lighting as a merchandising tool is seen in Raphan's rug and furniture store in Brooklyn, N. Y. where merchandise is presented in a dramatic and colorful setting under attention-compelling intensities. The entire store front is glass, turning the interior into a show window in which merchandise is dramatically presented as on a stage. In fact, this installation provides the flexibility of stage lighting with all of its selectivity of mood, accent, and intensity.

High intensity downlighting just inside of the show window line floods the threshold to attract attention and enliven the building facade.

The upper rear wall behind the curving stairway shown in the accompanying illustration is an important part of the vertical picture seen from the sidewalk. To avoid a somber effect, minimize daylight reflections and attract shoppers to the rear of the store, the lighting of this wall was carefully planned for reflectance, brightness, contrast, color and decorative effect.

A specialty area just within the oblique window line, visible from a considerable distance down the street, is provided with flexible spot lighting (185 ft-c).

All degrees of impact are possible: The main store area, (20-foot ceiling) ranges from a combination of general lighting of moderate intensity (30 ft-c) with high intensity, local display lighting (100-185 ft-c) to over-all lighting of high intensity (100 ft-c). The former is dramatic and impressive; the latter is powerful and spectacular.

The general lighting in the area shown in the picture is provided from 134 48-in. 40-w fluorescent strips above louverall ceiling patterns, variously shaped to provide novelty, conform with store proportions and influence direction of store traffic. This is supplemented with 104 150-w, PAR 38 projector spot lamps in louvered, recessed high hats arranged in diagonal rows providing complete or selective coverage of the centrally located display areas.

Rug racks under the mezzanine balcony are lighted by adjustable floods in hoods extending on curved arms from the edge of the balcony.

The wall above a large linoleum display is livened up with opaque lettering silhouetted against the wall which is illuminated by a fluorescent cove. Decorative wall plaques add further variety and interest.

Incandescent Used as in Home

The mezzanine furniture area is lighted with recessed incandescent down lighting, with an ample scattering of floor lamps to provide hominess and ceiling brightness. Accent lighting is provided from flexible hoods that can be selectively located on a system of capped outlets covering the entire area.

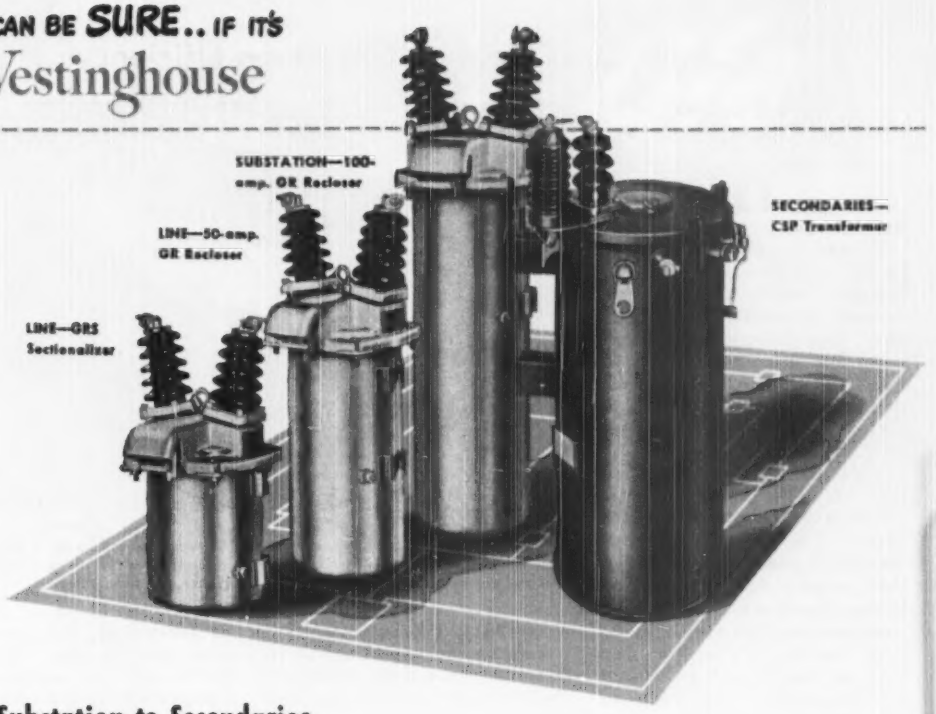
A rear store carpet area is generally illuminated with recessed incandescent units. The wall space is covered with carpet display racks highlighted with incandescent, adjustable flood lighting. The carpets are presented wholly under incandescent lighting in this area, in keeping with the lighting that is universally found in the carpet-covered areas of the home.

The lighting load totals 90 kw over a store area of 7,500 sq ft averaging 12 w per sq ft. In the 20-ft area, 26 w per sq ft provide 135 ft-c over an area of 2,100 sq ft. A total of 864 lamps is used, 372 fluorescent and 492 incandescent.

This installation was designed by John Gunther and the author, lighting engineers of Consolidated Edison. It was a prize winner in the 1949 General Electric Planned Lighting competition.

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



From Substation to Secondaries...

COMPLETELY MECHANICAL SYSTEM PROTECTION

...for lower, long-term distribution costs!

In this case, "mechanical" means a *fuseless* protective system... and one which promises many long-term, cost-saving advantages for rural and suburban lines. Specifically, it's a system which eliminates fuse replacement costs; which stays in proper co-ordination *permanently;* which simplifies the job of re-energizing faulted lines.

Its basic elements are those pictured above. The new Westinghouse GRS Sectionalizer, which is used in place of fuses, is its key component. Co-ordinated with substation reclosers, line reclosers and CSP Transformers, the sectionalizer permits—for the first time—attainment of a completely automatic, mechanical protective system... a *sure* way to gain this important objective:

The highest degree of service continuity at the lowest long-term cost!

The mechanical protective system is one of those analyzed in Booklet B-4700, which covers advantages, limitations and cost considerations of all types of protective schemes for rural and suburban lines. For your copy of this practical guide to better protection planning, write: Westinghouse Electric Corp., P.O. Box 868, Pittsburgh 30, Pa.

J-60738

Westinghouse

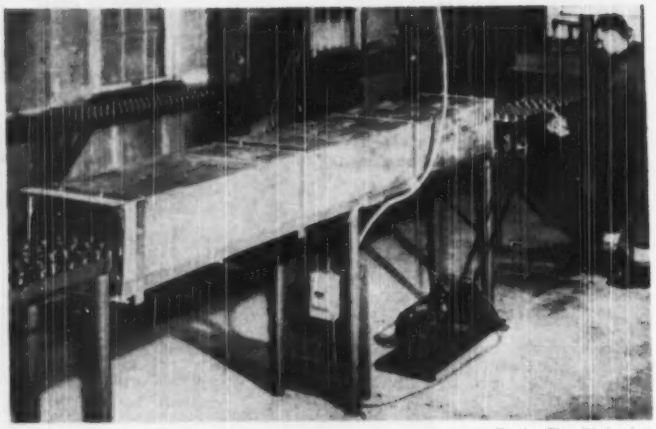
DISTRIBUTION APPARATUS

Radiant Glass Heating Ups Oven Efficiency

ELECTRICAL ENGINEERING IN INDUSTRY

RADIANT GLASS heating panels installed in an oven at Hydro-Carbon Industries, Inc, Bradford, Pa., manufacturers of petroleum passenger car flares, have increased the efficiency and safety of the oven and saved valuable floor space—compared with the previously used gas-fired drier, according to Dr. H. M Spencer, company chemist.

The oven has a total connected load of 17 kw and is used to extract solvent from the ½-pt cans of petroleum mixture. The cans are run through the oven on a conveyor and 0.6 lb of water per gal of mixture is driven off. Heating panels are mounted underneath conveyor. This oven dehydrates 7,200 cans in one 8-hr shift. Cans enter the oven at 150 F and mixture is boiled at 208 F. Setting temperature is 230 to 250 F (solid).



Corning Glass Works photo

ELECTRIC OVEN for extracting solvent from petroleum mixture used in passenger car flares has eight radiant glass heating panels for a total load of 17 kw. It is more efficient safer and requires less space, than the previously-used gas fired drier

Since this oven uses a heat-wave reflection system, a better efficiency is claimed from the radiant glass heating panels than with conventional electric steel hot plates. Dr. Spencer says this may be due to greater amount of heat radiated from the glass panels.

WELL-PLANNED KITCHENS result from work carried on by Miss Wanda Seby of Toledo Edison. Left to right—Miss Selby (left) plans a remodeling job with a housewife . . . goes over a layout with another customer . . . studies a scale model . . . puts all space to work

Kitchen Planning with a Feminine Touch

DREAM KITCHENS are coming true in Toledo under the guiding touch of Miss Wanda Selby of the Toledo Edison Co's residential service department. Since the company announced that kitchen planning services were available upon request Miss Selby has averaged nearly 120 kitchen planning jobs a year. This has resulted just from acceptance of the service and without further selling or advertising of the activity. So far all work has been made on request.

Kitchens are planned and wiring and lighting layouts are provided. Suggestions have been followed in almost all cases. On remodeling jobs Miss Selby measures the kitchen personally, talks to the housewife about what she would like to have and how she wants it. Plans are made on a scale of ¼ in. to 1 ft and supplied free to the customer, who then consults a contractor.

In the case of new homes, the customer brings in the home plan. Vellum is placed over this and suggested kitchen plans, suggestions on wiring and other ideas are drawn on it. This is supplied to the customer who works with the contractor. Objective is to make the kitchen pleasant, attractive and efficient, utilizing all space.

Longer Life

WITH JOSLYN URC POLE LINE HARDWARE

Extend the Life Span of your pole lines by using Pole Line Hardware made of low alloy high strength steel. This steel will resist atmospheric corrosion four to six times longer than carbon steel and, with the additional protection of Joslyn galvanizing, the expected life of pole line hardware is at least doubled—and this at a negligible increase in cost. Costs of Pole Line Hardware made of URC are only approximately one-third greater than standard structural material—a cheap price to pay for double the life. In addition to this, URC hardware is stronger, with a minimum yield strength 50% greater than that of regular steel.

If you are in an area where this happens to your hardware before the ultimate life of the rest of the line has been reached—better consider Joslyn URC Hardware.

Write for new catalog of Long Life Pole Line Hardware.

Branch offices in principal cities

THE JOSLYN CO.
THE SOUTH EAST JOSLYN CO.
SOUTHERN JOSLYN CO.
JOSLYN SOUTHWEST CO.
JOSLYN PACIFIC CO.

JOSLYN MFG. AND SUPPLY CO.

Complete Pole Line Equipment

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In the field of electronics and the electrical goods industry, MOSINEE is known for its *dependable uniformity*, and its scientifically controlled physical and chemical properties, such as:

Good dielectric strength . . . proper softness or stiffness . . . high tensile or tear strength . . . creped with controlled stretch or flexibility . . . specified pH for maximum-minimum acidity or alkalinity . . . accurate caliper, density, liquid repellency or absorbency.

If you have a fabricating or processing problem involving paper, a discussion with MOSINEE technicians might prove helpful. Please write Dept. EW.

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"Essential Paper Manufacturers"

INDUSTRIAL BRIEFS

Electrically Heated Clay Screens eliminate blinding, increase quality of products and more than double daily usable shale tonnage at the Standard Brick & Supply Co., Charleston, W. Va. Screens last longer and finer mesh screens can be used—thus increasing quality. Screens are able to pass 80% of fine shale on first pass—reducing amount of circulation necessary. There is less dust and noise.

The screen heating load is 30 kw. Transformers feed 4.5 v to screens using bus straps.—R. H. Hively, Appalachian Electric Power Co, Charleston, W. Va.

Surface Raceway distribution system provides balanced circuiting and available and flexible power distribution in the Russ Dawson, Inc, Garage, Highland Park, Mich. New receptacles can easily be added in the raceway by simply fishing in the circuit, cutting a section out of the snap-on cover, inserting receptacle, and snapping new cover plate in place. Garage has eight 100-ft-long duct runs spaced 10 ft apart with receptacles at 10-ft intervals. System eliminates drop cords, chains, boxes and conduit previously used to provide uniform spacing for fixtures.

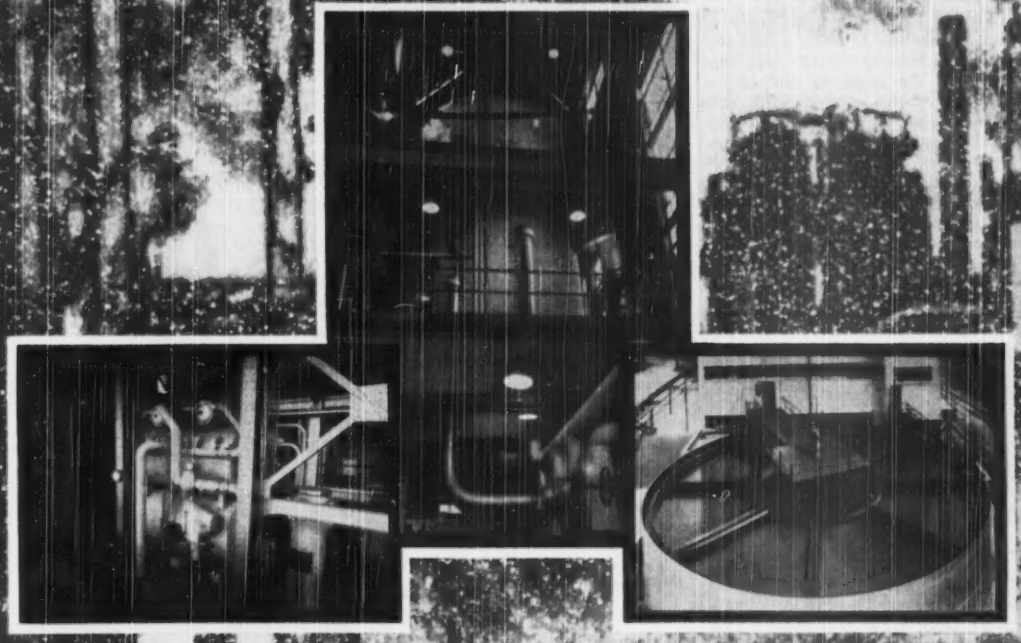
Capacitors Save $2,700 annually at the Empire Flow Co, Cleveland, Ohio. The power factor was boosted more than 30% and the whole installation paid for itself in 8 months. Four capacitors were installed—two 90 kvar and two 30 kvar. Units were banked on the plant distribution system. Total cost of installation including capacitors, switches, etc, was $1,907.

Controls Coordinate ore mixing operations at the American Smelting and Refining Co, Selby, Cal. Two motor control centers tie together eight remote pushbutton stations which control the complex system of elevators and conveyors for moving and mixing gold, silver and lead ores, making it almost completely automatic. This installation provides a well-protected, easily accessible control center which saves space and simplifies routine maintenance.

COCHRANE

87 YEARS OF SERVICE

PIONEER AND LEADER IN METHODS AND APPARATUS FOR COMPLETE CONDITIONING OF BOILER FEED, PROCESS AND INDUSTRIAL WATER SUPPLIES



COCHRANE CORPORATION

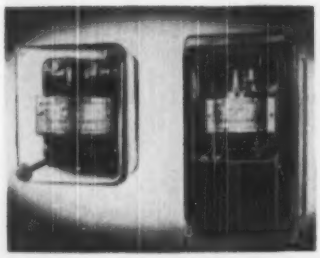
PHILADELPHIA 32, PA

In Canada: Canadian General Electric Co., Ltd., Toronto

In Mexico: Babcock & Wilcox de Mexico, S. A., Mexico City

In Europe: Representation Thermique & Operation, Paris

NEW EQUIPMENT



Relays

PROTECTION against overcurrent, undercurrent, and reverse current in dc circuits is furnished by the Type D-3 relay. The operating voltage is supplied by a shunt in series with the protected line. The moving coil is in parallel with the shunt so it will receive current in proportion to the current flowing in the line to be protected.

The DT-3 relay is for protection of transformers and ac or dc motors and generators from abnormally high temperatures. An exploring coil in the windings of the protected apparatus forms one leg of a resistance bridge which supplies the operating energy for the relay.

A permanent magnet core within the moving coil of the relay is reported to cut the relay size to almost half that of its predecessor. Further details are in Bulletin 41-260.

Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.

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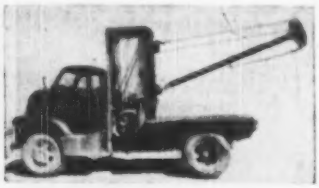

Hydraulic Truck Crane

ONLY 35 in. behind the cab is reported necessary to make room for installing a mobile truck crane that can be used with any make winch. Features of the Hydra-Lift include:

1. Positive action in placing loads due to hydraulic operation.

2. Boom swings in 180-deg arc, speed regulated by truck driver from cab.

3. Boom can be used for straight line pull, and to load and unload off truck bed.

4. Boom of seamless steel tubing can be telescoped from 11 ft to 16 or 20 ft.

5. Outriggers are adjustable in height to allow for uneven terrain when lifting over the side.

Capacity varies from 6,000 lb with boom at 11 ft to 2,500 lb at 20 ft. The hydraulic system, operating at 1,250 psi, can be run off fan belt or power take-off.

Pitman Mfg Co, 300 W. 79th Terrace, Kansas City 2, Mo.

•

Preset Speed Device

A FIXED PRESET speed can be achieved with the ACA (ac adjustable-speed) motor by means of a mechanical follow-up control. The device enables a speed to be set manually by a knob either directly on the ACA motor or at the end of a flexible cable 10 or 15 ft away. The adjustment can be made while the motor is at standstill or while running.

In operation, the new mechanism actuates a pilot motor which drives the brushes to a position corresponding to the setting of the knob. Accelerating time is dependent upon pilot motor speed.

General Electric Co, Apparatus Dept, Schenectady 5, N. Y.

•

Ground Tester

RESISTANCE to earth of man-made grounds can be measured with CVM type Megger ground tester to ascertain if resistance is low enough to ensure correct operation of the grounds and minimize lightning dangers.

The terminal arrangement employs two switches which short circuit the terminals for 2, 3, and 4-terminal tests. Two ranges are available: 0 to 40 and 0 to 200 ohms; 0 to 100 and 0 to 500 ohms. The set has its own generator. Additional information is in Bulletin 25-80-9.

James G. Biddle Co, 1316 Arch St, Philadelphia 7, Pa.

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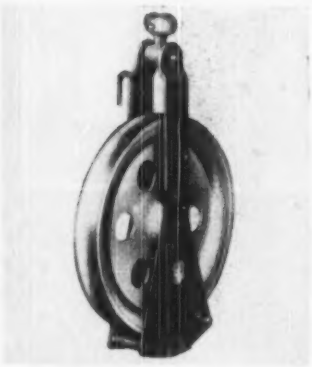

Stringing Block

SELF-LOCKING head of No. 7772 snatch block for stringing transmission line is reported safe from accidental opening. Conductors up to 1.26 in. diam can be accommodated. Drop forged fittings, steel straps, and four-point bracing add to strength of the block. A hand line hook is provided for the lineman's convenience.

Supplied with various style fittings.

HUBBARD
TIE ROD TYPE UPSWEEP MAST ARMS

THE HUBBARD Tie Rod Mast Arm, with the famous Hubbard Keyhole design, is made in lengths of 8, 10, 12, and 14 feet, is easily installed, is well braced against side sway, and has the strength to support an extremely heavy vertical load. The ⅜-inch tie rods have 6-inches of thread at each end to allow for irregularities of mounting.

The 1¼-inch pipe will accommodate two-conductor No. 8, 6000 volt cable. Internal wiring is easy, for there are no angles, sharp bends, or obstructions.

Write for Literature

Check these advantages

- Exceptional strength . . . tie rods fastened to side of pole to minimize "sway."
- Design permits maximum elevation of luminaire.
- Meet all EEI-NEMA specifications.
- Graceful simplicity—light weight—low cost.
- "Free-flowing" internal wiring—beveled pipe ends—no sharp bends—no obstructions.

HUBBARD AND COMPANY

ESTABLISHED 1843

PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA

"Hang the Load on Hubbard Hardware!"

FREEDOM FROM STARTER TROUBLES

For just 90 CENTS more

HERE'S YOUR CHOICE:

"old-fashioned" conventional ballast and No-Blink starters that would often require starter replacements

OR

fast-starting Guth Quickliter Ballast...and never again starter troubles; for only 90 cents more per 2-lamp, 4-ft. fixture. This is less than the cost of replacing a starter once.

Every Guth 40w fixture is available with Quickliter ballast. Instant Start lamp prices, lumen output, and life expectancy are virtually the same as those of regular 40w lamps. Don't you have enough headaches anyway? You can avoid at least this one and save your aspirin for others.

GUTH QUICKLITERS are featured in our catalog number 47-H Write for a copy today!

Guth LIGHTING

THE EDWIN F. GUTH COMPANY • ST. LOUIS 3, MISSOURI

Leaders in Lighting Since 1902

including hook, shackle, socket connector, or swivel eye and chain, the sagging blocks may be had in 7, 10 and 14-in. sizes.

Sherman & Reilly, Inc, Chattanooga, Tenn.

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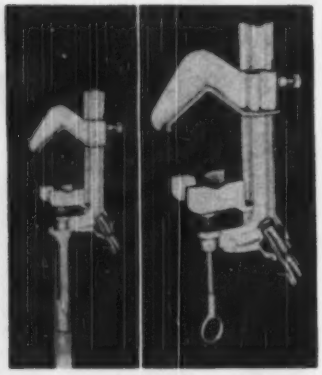


Bus Bar Grounding Clamp

BY CHANGING the position of the upper jaw, a bus bar grounding clamp can be made to fit a variety of conductors. Minimum size that can be clamped is No. 6 Str. Cu; maximum sizes are 2⅞ in. diam, 4x½ in. rectangular, and 3x3 in. square. Maximum jumper size is 4/0 grounding cable, 600 or 5,000 v. Illustration (left) shows clamp permanently attached to operating stick. At right, eye screw clamp which can be installed with standard clampstick.

Bodendieck Tool Co, 325 E. Main St, Taylorville, Ill.

•

Under-Voltage Protection

FOR POWER CIRCUITS subject to voltage dips or to momentary loss of power, a new under-voltage protection system is said to allow the motor to re-accelerate if voltage recovers within two seconds or less. The starter remains locked-in

MORE NEW EQUIPMENT

Just Received

Appearing Next Issue

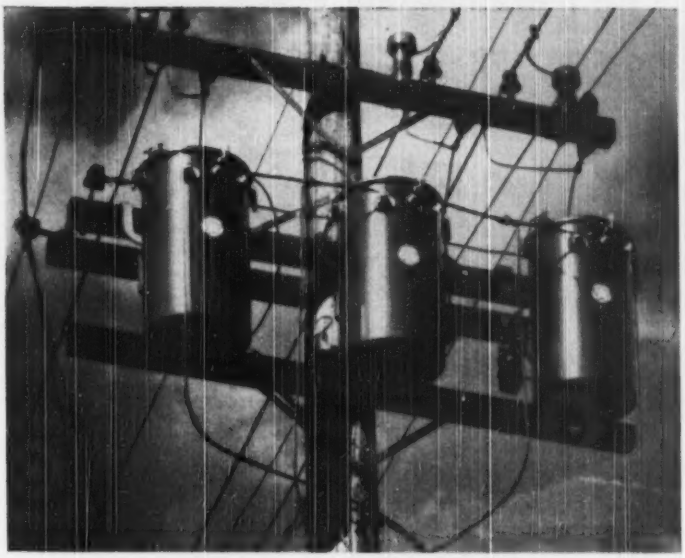
OVERCURRENT RELAY
Useable where long-time delay is needed for light overloads

THERMOSETTING LAMINATE
Class A insulation is suited to oil-filled transformers, etc

BACKFILL BLADE ATTACHMENT
Expedites covering and leveling of trenchwork for cable runs

WIRE AND CABLE INSULATION
Flame-retardant plastic insulation for street-light cables

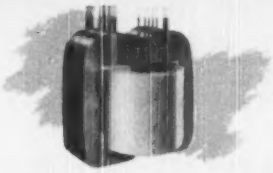
The *Secret* of the POLE STAR . . .



Laminations brought through the coils and individually lapped — that's the secret of the Pole Star core and why Pole Stars are recognized for their low exciting currents and their many other advantages.

Core laminations individually lapped

★ Low exciting current is an inherent characteristic of the Pole Star. The large cross section area at the lap reduces the density and prevents a concentration of flux. Therefore, the reluctance of the magnetic circuit is low. Actually, each lamination is a core itself, forming its own magnetic path undisturbed by butt joints and points of high density.



75 Kva Core and coil unit

★ The lapped Pole Star construction eliminates the need for clamping the core. No mechanical clamping device is required since there are no gaps or butt joints in the core. Each Pole Star core lamination is lapped on itself. The amount of contact pressure between laminations is not important. As a result, the noise level in the core is fixed at a low level, and will not change.

Core and coil units easily taken apart and rebuilt

★ In the event a coil is damaged by lightning or excessive overloading, cores can be taken apart and rebuilt with replacement coils. This can be done without appreciably affecting the low core loss or exciting current of the Pole Star. Utilities recognize the great savings in time and money derived from being able to replace coils in their own shops. All Pole Star core and coil units, 3 Kva through 100 Kva, can be taken apart and reassembled.

Pole Star transformers are available in single phase sizes 3 Kva to 100 Kva and in vertical three phase sizes 9 Kva to 112½ Kva, 14,400 volts and below.

Pennsylvania
TRANSFORMER COMPANY
Canonsburg, Pennsylvania - Greater Pittsburgh District

P.S. Let the **POLE STAR** be your guide . . .

Product Of Long Experience
Safe Thrifty And Reliable

down to a low voltage.

Pushbutton control circuit is changed to introduce capacity into the coil circuit after the contactor closes. A small timing relay keeps the pushbutton operating coil circuit "active" so that the motor will re-start if normal voltage returns within the timing of the relay. Contacts are reported to break cleanly after voltage falls below about 25% of normal. This UVP circuit is available on magnetic starters for both low and high voltage.

The Electric Controller & Mfg Co, 2700 E. 79th St, Cleveland 4, Ohio

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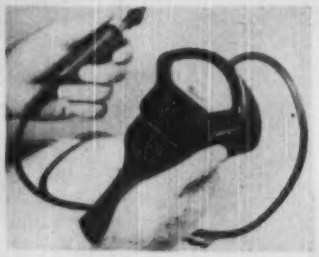

TACHOMETER—Electric hand tachometer Type 25D has speed measuring ranges of 100-1,000, 200-2,000 and 500-5,000 rpm and fpm; also 10-100, 20-200, 50-500 fpm. Range extending adapters are available to measure speeds as low as 20 rpm and as high as 50,000 rpm. No adapter is needed for speeds encountered in motor and generator testing.

Metron Instrument Co, 3432 Lincoln St, Denver 9, Col.

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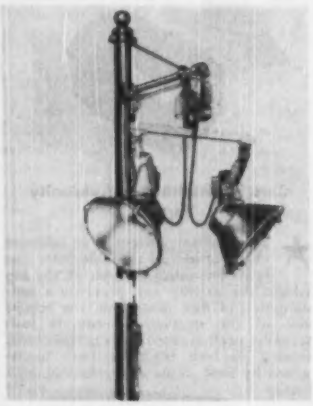


Floodlight Suspension

A DUAL-FLOODLIGHT suspension yoke has been designed for use with outdoor models of the company's disconnecting and lowering hangers. The device supports two bail-suspended floodlights from a single hanger, so that the two lights can be focused independently while operating on a common cir-

Eliminate VOIDS with G&W NOVOID Insulating Compounds

Heavy steel pails permit convenient heating the compound in the pail.

Purpose: Compound is used in potheads, cableheads, boxes and cable joints to fill the internal space with an insulating material which improves the electrical characteristics of the installation. Compound affords some protection against moisture but this is secondary in equipment inherently water and air tight.

Hot compound poured into a device during the original installation vaporizes and expels moisture.

Proper compounding around END of the grounded shielding or sheath of a cable is most important because voids there may result in failure of cable insulation in these zones of greatest electrical stress.

The internal flashover of a cable device is increased by imbedding the cable insulation in compound. Thus shorter creepage paths are permissible with cable in compound than on cable insulation in air.

Essential Properties: Chemically inert, adhesive and "tacky." Low moisture absorption. Low volatile loss. Low dielectric loss and adequate dielectric strength. Suitable melting point *to permit compound to flow into smallest crevices before solidifying.* High flash and fire points *for protection of the handler.*

ASPHALTIC BASE—

NOVOID "A"—*(Medium soft)*—For usual installations of sealed potheads (capnut and disconnecting types).*

NOVOID "C"—*(Medium hard)*—For straight through type potheads having no definite seal. For hot climates and exposures. For cable boxes and splice boxes.

OZITE "B"—*(Medium soft)*—For general use, particularly recommended for cable joints because of its low power factor.

**Novoid "9A" (Very soft) is available for single conductor potheads and spreader head installations on 34.5 kv. and higher voltages.*

OIL INSOLUBLE—

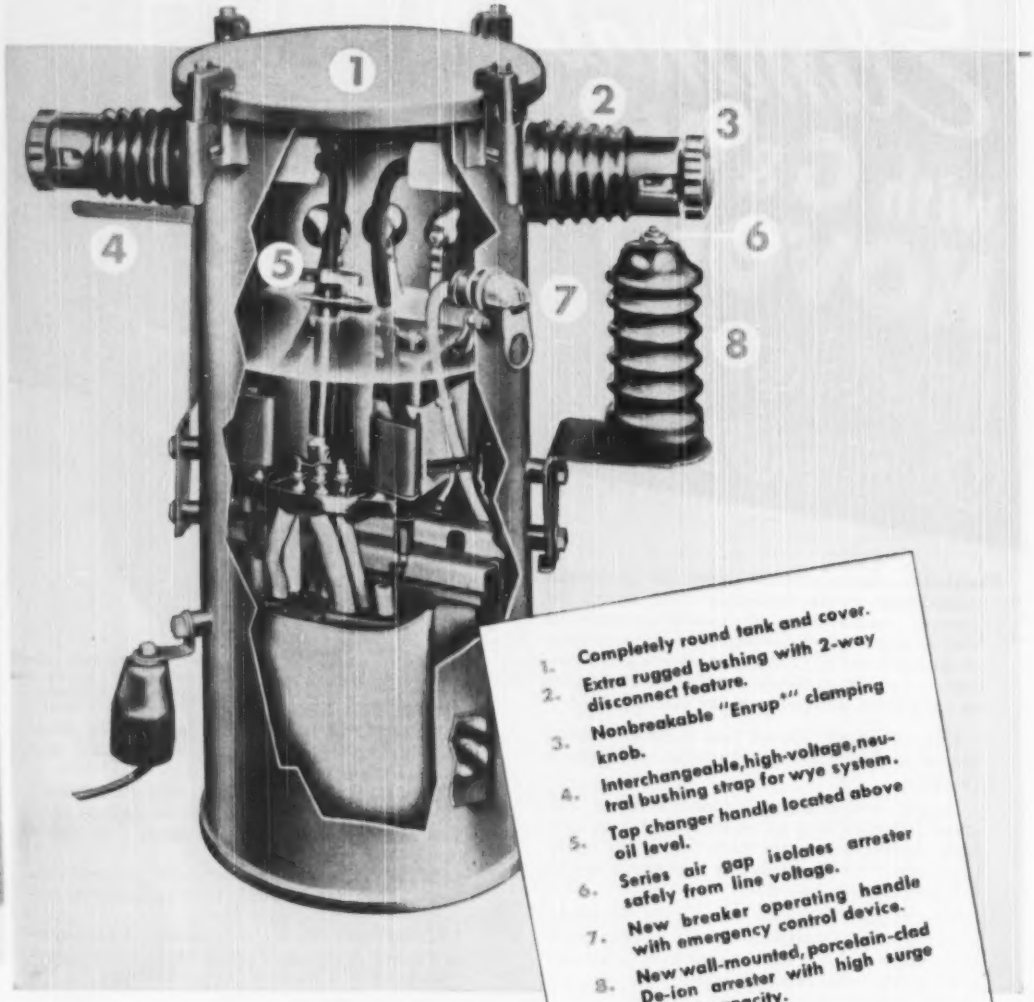
NOVOID "X" has all the properties of other Novoid compounds plus the added advantage of insolubility in mineral oils. It is recommended for use in potheads and cable joints when necessary to avoid troubles due to migration. It has a tendency to "stay-put" because it does not mix with cable oil.

G&W ELECTRIC SPECIALTY CO.

In Canada, POWERLITE DEVICES, LTD., Toronto · 7780 QUANTE AVENUE, CHICAGO 19, ILLINOIS

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



1. Completely round tank and cover.
2. Extra rugged bushing with 2-way disconnect feature.
3. Nonbreakable "Enrup*" clamping knob.
4. Interchangeable, high-voltage, neutral bushing strap for wye system.
5. Tap changer handle located above oil level.
6. Series air gap isolates arrester safely from line voltage.
7. New breaker operating handle with emergency control device.
8. New wall-mounted, porcelain-clad De-ion arrester with high surge current capacity.

* TM Reg. U. S. Rubber Co.

IMPROVED HIGH-VOLTAGE BUSHING . . . two to three times stronger than previous bushings. All high-voltage live parts including line electrode of isolating gap enclosed in porcelain. "Enrup" knob eliminates danger of bushing breakage during shipment, storage, transportation to job site and during installation. Leads may be inserted from either side and hand-tightened by simply turning the "Enrup" insulated knob. Tests show this connection clamps line leads twice as tightly as any previous bushing.

ANNOUNCING

A NEW "CSP" TRANSFORMER

Meets ASA and EEI-NEMA Standards

The newest in the line of Westinghouse "CSP" Distribution Transformers, simplifies installation and stocking problems. Like all "CSP" (Completely Self-Protecting) Transformers, this new design has both lightning and thermal protection built in... features that help *cut your distribution costs.*

IMPROVED DESIGN . . . SIMPLIFIES INSTALLATION . . . SAFER TO WORK ON . . . The completely round tank provides most effective seal, allows more free working space between transformer and pole and eliminates looping high-voltage leads.

SIMPLIFIES STOCK PROBLEMS . . . Readily convertible for either wye or delta systems. Class A Transformers, with lightning arresters for both hv leads serve delta systems; Class B-1, with one arrester only, for wye. Companies operating both systems need stock only Class B-1 with a spare supply of arresters. To convert to Class A, simply remove the neutral bushing strap and replace with a hv De-ion® arrester.

Available in ratings of 5000 volts and below and 100 kva and below. Also available in conventional models. Ask your Westinghouse representative for further information on the Type "RW", or write for DB 46-100 "CSP", Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-70571

Westinghouse "CSP" TRANSFORMERS

Dependable FIRE PROTECTION...

STARTS WITH
ANSUL
water-tight
CONSTRUCTION

CUT AWAY VIEW, ANSUL MODEL 20-B

The new, improved Ansul Model "B" Extinguishers have the greatest fire-killing ratings* ever attained by hand portable fire extinguishers. In addition, WATER-TIGHT CONSTRUCTION, (exclusive with ANSUL) has resulted in far greater dependability than any other dry chemical extinguisher.

In fire protection equipment, the best is none too good. Accordingly, Ansul engineers conduct continuing research for improving Ansul Extinguishers and Dry Chemical. Ansul Quality has set a high standard for newcomers in the dry chemical fire extinguisher field. This unparalleled standard of quality is constantly being raised by Ansul research and development.

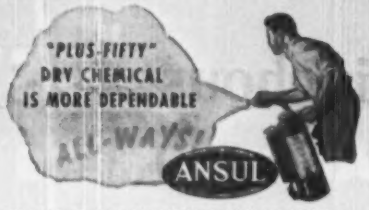
Send for File No. 609. You will receive a variety of helpful printed matter. Included is our latest catalog which describes Ansul Extinguishers of all sizes — from the small Ansul Model 4 to Ansul Piped Systems and Ansul 2000 lb. Stationary Units.

*Factory Mutual Laboratory Reports of Examinations and Tests.

Exclusive Features

- Patented Nozzle assures most effective stream pattern . . . Best results by inexperienced operators.
- Special packings in Nozzle and other parts exclude water.
- Corrosion resistant construction throughout.
- Easy on-the-spot Recharging (No tools needed).
- Quick, *positive* puncture operation.
- Special cartridge guard protects cartridge . . . rugged construction throughout.
- Ansul *"PLUS-FIFTY"* Dry Chemical used exclusively.
- Field tested by thousands of satisfied customers.

ANSUL
CHEMICAL COMPANY
FIRE EXTINGUISHER DIVISION
MARINETTE • WISCONSIN
DISTRIBUTORS
IN ALL PRINCIPAL CITIES IN THE U. S. A., CANADA AND OTHER COUNTRIES



THIS TRADE MARK ASSURES YOU OF QUALITY PRODUCTS

cuit. The single hanger permits lowering the fixtures to ground level for servicing. Yoke and hanger are fabricated from corrosion resistant aluminum alloys.

Thompson Electric Co, 1101-14 Power Ave, Cleveland 14, Ohio

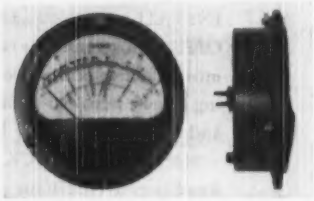
•

Pintype Insulator

DESIGNED for raising insulation levels on present or proposed low voltage lines, a pintype insulator has a rated 60-c dry flashover of 95 kv and a wet flashover of 60 kv. Manufacturer reports that little maintenance is needed in fog and contaminated regions because the insulator has a self-cleaning design and a leakage distance of 15 in. The No. 26 pintype has a nominal voltage rating of 27 kv and can be supplied plain or radio-freed. Further information appears in Bulletin 4.

Victor Insulators, Inc, 10 Maple Ave, Victor, N. Y.

•



PANEL METER—Hermetically sealed panel meter has a solder type zero adjuster to provide adjustment without breaking the hermetic seal. The instruments are 4½-in. size, 1⅝ in. deep, 1% and 2% accuracy rating.

Marion Electrical Instrument Co, Manchester, N. H.

•

Variable Transformers

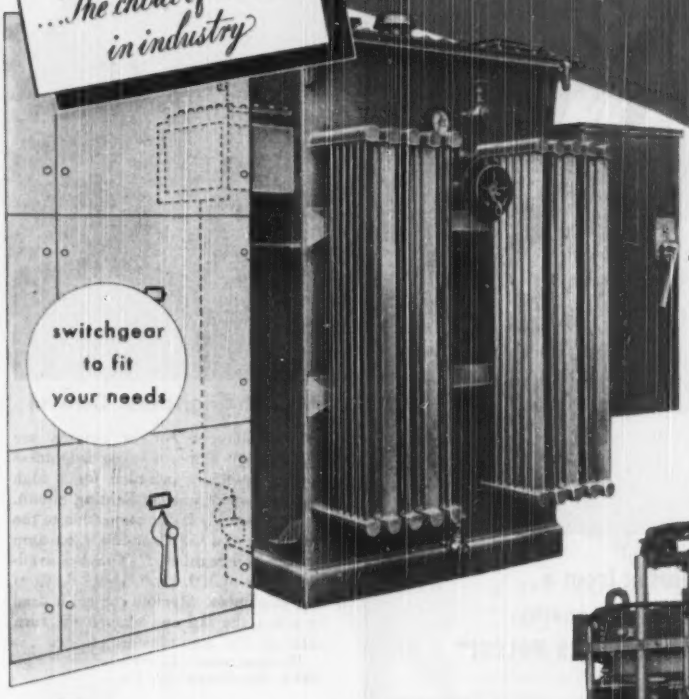
IN HAZARDOUS areas the explosion proof Powerstats are said to provide a safe means of obtaining a continuously-adjustable source of ac voltage. The transformer is totally enclosed in a

WAGNER TRANSFORMERS
...The choice of leaders in industry

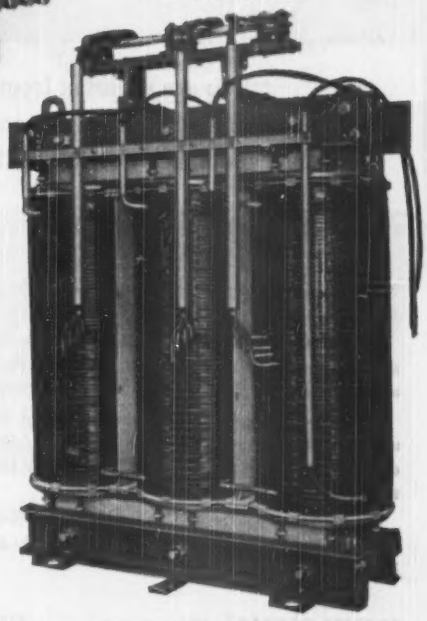
Wagner Unit Substation Transformers

designed to meet your distribution requirements

switchgear to fit your needs



Core and coil assemblies of Wagner unit substation transformers are designed by experienced engineers, and built and tested by skilled workers. Highest quality materials are used throughout, and meticulous attention to detail marks each step in their construction.



The transformer is the vital part of a load center distribution system. If the transformer fails, the entire system is dead whereas only part of the distribution system is affected by the failure of a switch or circuit breaker.

You can be sure of a dependable continuous flow of power from a Wagner transformer and you can be sure that it has been carefully designed to meet your distribution requirements.

Wagner unit substation transformers with incoming high voltage switch sections to meet your requirements, and with proper throats on the secondary side to connect to any make of switchgear, are available in the usual range of ratings up to 2000 kva. Our factory-trained sales engineers are well qualified to recommend the various combinations necessary to handle your unit substation requirements and they will be glad to give you immediate service.

Wagner unit substation transformers have been installed in all kinds of industrial plants including synthetic rubber, petroleum, steel, chemical, aircraft, automotive, paper, and many others. The importance of the transformer in a unit substation justifies calling in the Wagner sales engineer to help solve your load center problems.

Bulletins TU-13 and TU-56 describe the design and construction features that make Wagner liquid-filled and dry-type unit substation transformers outstanding.

WAGNER ELECTRIC CORPORATION
6456 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC · MOTORS · TRANSFORMERS · INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

BRANCHES IN 29 PRINCIPAL CITIES

● This patient is learning, *the hard way*, that he should have bought Koppers Poles.

Yes—it most certainly pays to purchase Koppers Full-Length Pressure-Creosoted Poles. For longer pole life. For longer periods of *uninterrupted* company service. For lower annual operating costs.

Scientifically and thoroughly pressure-treated with creosote in vacuum-pressure equipment, Koppers Poles are *fully* protected against decay. They *retain* their strength, through the years, no matter how severe the climatic conditions.

For maximum pole service, be sure to specify Koppers. Write us for a quotation. We can make deliveries promptly from many conveniently-located treating plants.

KOPPERS COMPANY, INC. PITTSBURGH 19, PA.

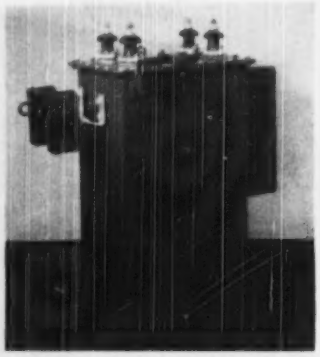
KOPPERS PRESSURE-TREATED WOOD

case reported to withstand internal gas or vapor explosions.

Various types are available in 115 and 230-v ratings for 1-ph operation for Class 1, Group D service.

The Superior Electric Co, Hannon Ave, Bristol, Conn.

●



Airport Brightness Control

Five different current outputs are provided by a new oil-type brightness control assembly intended for a high intensity series runway lighting circuit.

The assembly is for connection to the secondary of a 15, 20, or 25-kw, 6.6-amp moving coil regulator. It makes available steps of 100, 25, 5, 1 and 0.2% of full brightness. Remote control is used to select the tap and change the turn ratio of the autotransformer.

Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.

●

Control Center

Up to six Size 1 or 2 starters can be mounted in a standard vertical section 20x20x90 in. on the Plug-In control center. The units have positive pressure stabs which grip round vertical buses. Units slide on corner guide rails to make removal or exchange easier.

Circuit breakers are new Type ML

You Get This Same "One-Piece" Jaw in ALL FARGO AUTOMATIC LINE SPLICES

THE LS SERIES
is the standard, reclaimable type splice, available in sizes from 8 strand through 500 MCM.

THE RLS SERIES
is a reducing splice, available in all commonly used conductor combinations.

THE JS SERIES
is similar to the standard splice in operation and is used where reclaimability is not important. Limited to most popular wire sizes and lower in cost.

THE SFT SERIES
is an automatic insulated splice used for series street lighting, secondary networks, primary breaks for cutouts and regulators.

THE AMS SERIES
is an automatic splice for use on copperweld messengers. Available in sizes from 3 No. 9's to 5/16".

You Get These Same Time and Labor Savings in ALL FARGO AUTOMATIC LINE SPLICES

- The greater strength and permanance that is provided by *FARGO "ONE-PIECE" JAW CONSTRUCTION.*
- Easy . . . quick installation that saves Linemen's time, and eases the job for the entire crew.
- No need to use tools — because they're automatic.
- Greater safety — because they require no tools.
- Lower overall cost — attested by wide and trouble-free use.

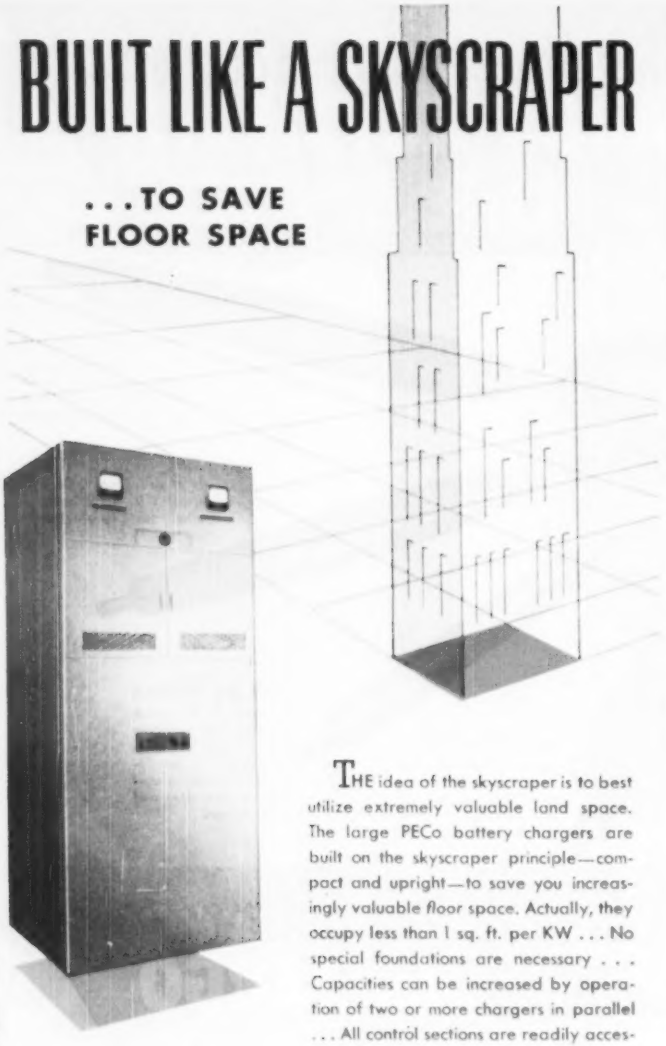
FARGO

Manufactured by
FARGO MFG. COMPANY, INC.
Poughkeepsie, N.Y.

Distributed by
LINE MATERIAL COMPANY
(A McGraw Electric Company Division)
Milwaukee, Wisconsin

BUILT LIKE A SKYSCRAPER

. . . TO SAVE FLOOR SPACE



THE idea of the skyscraper is to best utilize extremely valuable land space. The large PECo battery chargers are built on the skyscraper principle—compact and upright—to save you increasingly valuable floor space. Actually, they occupy less than 1 sq. ft. per KW . . . No special foundations are necessary . . . Capacities can be increased by operation of two or more chargers in parallel . . . All control sections are readily accessible. Rectifier assemblies are on removable trays to facilitate inspection or service . . . Fully automatic; electronically or magnetically controlled and regulated; accurate floating voltage control within ±1% . . . Complete range of sizes up to 10 KW . . . Write for all the facts.

POWER EQUIPMENT

Specialists in Controlled Rectifiers Since 1935

55 ANTOINETTE STREET . DETROIT 2, MICHIGAN

thermal magnetic. Starters incorporate NEMA Standard mounting dimensions and wiring schemes. Switches have visible blade, quick make and quick break design. Details appear in Bulletin 8938.

Square D Co, 4041 N. Richards St, Milwaukee 12, Wis.

•

Single-Phase Motor

FOR USE where a constant-speed high-torque 1-ph motor is required, a new repulsion-induction motor is an addition to the company's Tri-Clad line. Typical applications include pumps, stokers, floor surfacers, and farm uses such as barn hay curing, silo filling, etc.

The motor is the open drip-proof type, and is said to be adaptable for severe starting duty. Designated as Type SCR, it is available in 5, 7½, and 10-hp ratings, all 1,800 rpm. The 5-hp unit operates on 115/230 v, while the other two use 230 v.

General Electric Co, Apparatus Dept, Schenectady 5, N. Y.

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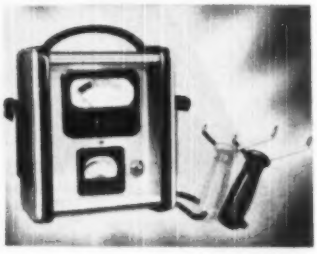


BATTERY TESTER—Checking of all three cells of a storage battery for condition as well as state of charge is reported made in 10 sec with the Battery-Scope. Operator places the two prods on the battery posts. Meter then reads "good" or "replace" on condition meter and "charge" or "recharge" on state-of-charge meter.

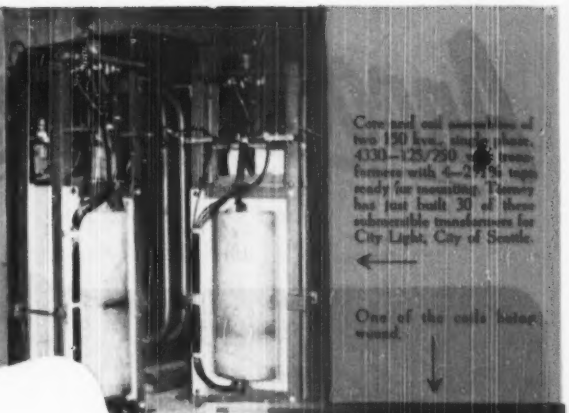
McColpin-Christie Corp, 4922 S. Figueroa, Los Angeles 37, Cal.

MORE NEW PRODUCTS about which you should know

BUCHANAN ELECTRICAL PRODUCTS CORP, 1290 CENTRAL AVE, HILLSIDE, N. J., has available new **knockout plugs** of snap-action type in sizes ½, ¾, 1, 1¼, and 1½ in. . . . WESTON ELECTRICAL INSTRUMENT CORP, 614 FRELINGHUYSEN AVE, NEWARK 5, N. J., has a pocket instrument, Model 8704, that indicates **relative humidity.**

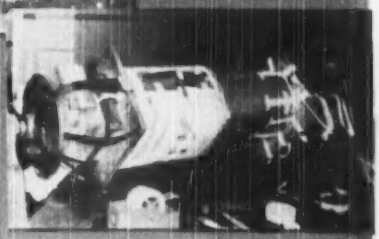
SHALLCROSS MFG CO, COLLINGDALE, PA., has several new oval rotary selec-

For Building or Rebuilding Transformers...



Core and coil assemblies of two 150 kva., single phase, 4330—125/250 volt transformers with 4—2½% taps ready for mounting. Factory has just built 30 of these submersible transformers for City Light, City of Seattle.

One of the coils being wound.



Natvar 400 Extruded Vinyl Tubing, approved for continuous operating temperature of 105°C., and with superior resistance to oil, is used to insulate and protect the leads.

Tierney uses NATVAR 400

The Tierney Electrical Manufacturing Company, Seattle, Washington, founded in 1933, repairs and manufactures distribution, power, and special transformers, and also repairs and rewinds any type or size of motor.

Like many other repair shops and smaller manufacturers, Tierney has discovered what the larger manufacturers already know—that it is profitable to standardize on Natvar products.

All Natvar flexible insulations are consistently uniform, no matter when or where purchased. They are immediately available either from your Wholesaler's stocks or direct from our own.

Natvar

Natvar Products

- Varnished cambric—straight cut and bias
- Varnished cable tape
- Varnished canvas
- Varnished duck
- Varnished silk
- Varnished special rayon
- Varnished Fiberglas cloth
- Silicone coated Fiberglas
- Varnished papers
- Slot insulation
- Varnished tubings and sleevings
- Varnished identification markers
- Lacquered tubings and sleevings
- Extruded vinyl tubing and tape
- Extruded vinyl identification markers

Ask for Catalog No. 21

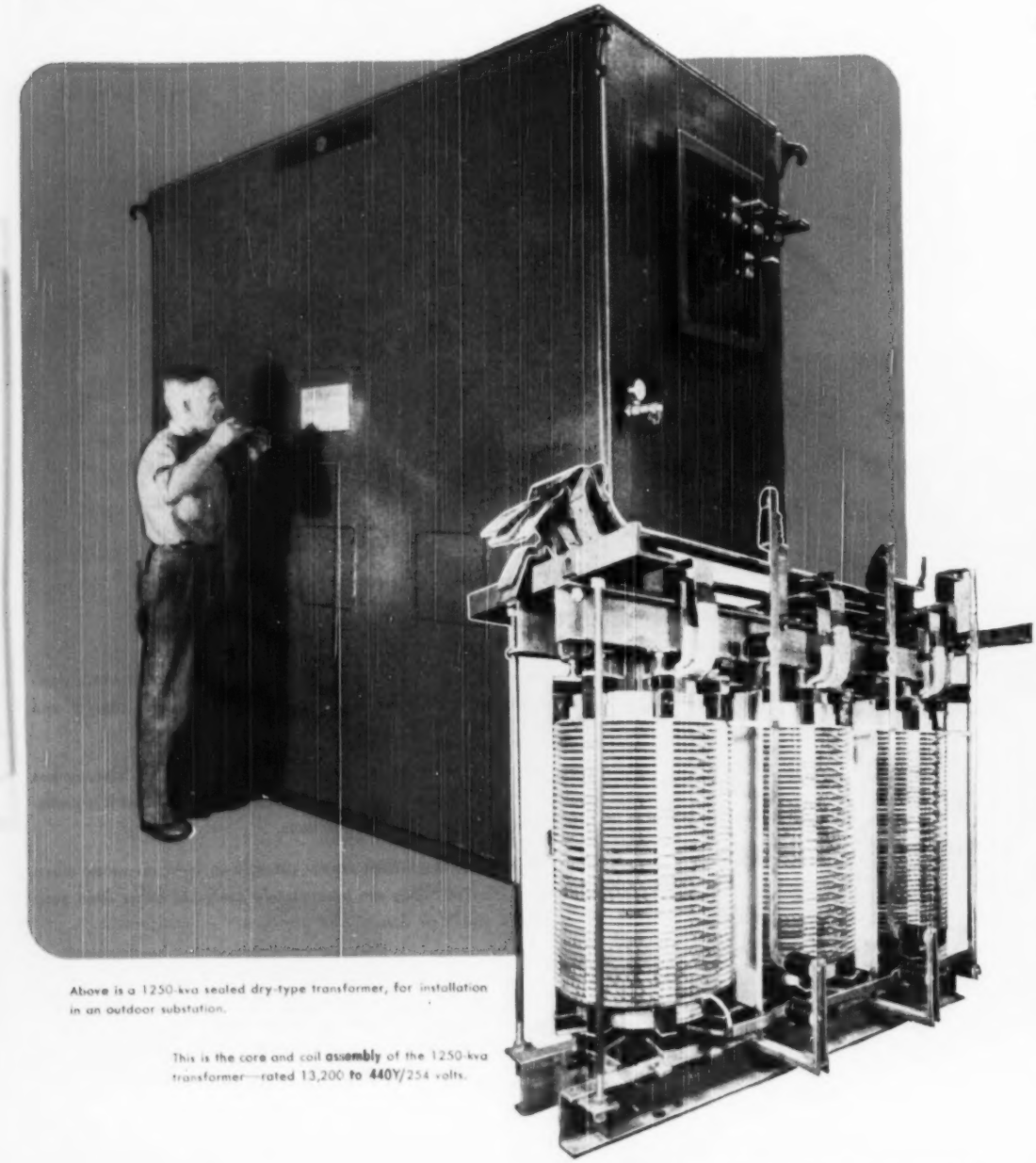
THE NATIONAL VARNISHED PRODUCTS Corporation

Telephone Rahway 7-8800

Cable Address NATVAR: Rahway, N. J.

221 RANDOLPH AVENUE ★ WOODBRIDGE, NEW JERSEY

Announcing GE Sealed



Above is a 1250-kva sealed dry-type transformer, for installation in an outdoor substation.

This is the core and coil **assembly** of the 1250-kva transformer—rated 13,200 **to 440Y/254** volts.

Dry-Type Transformers

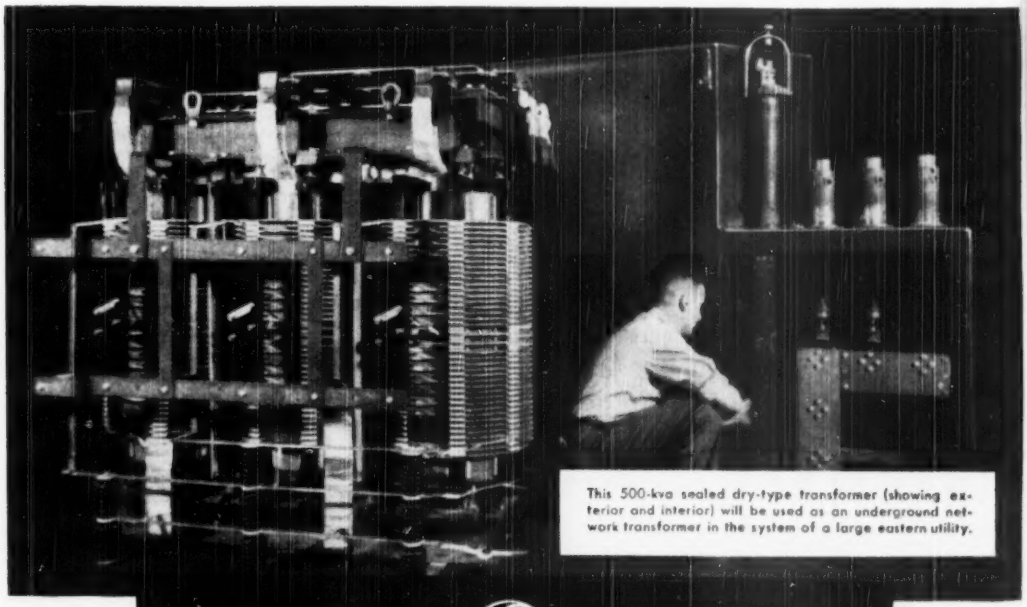
for INDOOR, OUTDOOR or UNDERGROUND service

with Class H Inorganic Insulation

- Nitrogen-filled tanks—no oil to maintain
- No tubes or radiators—installation and maintenance simplified
- Hermetically sealed—coils need no cleaning or drying
  —welded tank and metal-to-glass sealed bushings

Hermetically sealed dry-type transformers are now available in ratings up through 1500 kva and 15,000 volts. A product of General Electric research, these units can be supplied with G-E metal-clad switchgear for load center installations, or with network protector and high-voltage switch as a completely equipped network unit.

For further details refer to the nearest G-E Apparatus Sales Office or write *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*



This 500-kva sealed dry-type transformer (showing exterior and interior) will be used as an underground network transformer in the system of a large eastern utility.

GENERAL ELECTRIC

402-79

PUBLIC
RELATIONS
are
PLEASANT
RELATIONS
when BARTLETT clears your lines
EVERYBODY likes the Bartlett Tree Man . . . friendly, cooperative, and obviously skilled at his job; your customers will like the neatness and efficiency of Bartlett work, performed with a minimum of disturbance to their property and everyday life. Bartlett on the job is your assurance of more friendly public relations.
YOU receive plus value when you retain Bartlett for line clearance; contact our local office in your community or write direct to the home office; our nearest representative will call promptly.
BARTLETT SERVICE MEANS
• CLOSE SUPERVISION
• TRAINED MEN
• BEST EQUIPMENT
• CAREFUL WORK
• PROMPT SERVICE
• ECONOMY
• RESPONSIBILITY
BARTLETT
TREE EXPERTS
The Bartlett Way
HOME OFFICE: RESEARCH LABORATORIES & EXPERIMENTAL GROUNDS, STAMFORD, CONN.
LOCAL OFFICES: Rutland, Windsor, Vt.; Milford, Peterboro, Rochester, N. H.; Cambridge, Framingham, Manchester, Osterville, Pittsfield, Mass.; Providence, R. I.; Danbury, Hartford, New Canaan, New Haven, Stamford, Westport, Conn.; Islip, Kingston, Monroe, Middletown, New York, Peekskill, Southampton, Syracuse, Westbury, White Plains, N. Y.; Bernardsville, Morristown, Orange, N. J.; Chambersburg, Paoli, Philadelphia (Cynwyd), York, Pa.; Wilmington, Del.; Bethesda, Easton, Towson, Md.; Ashland, Ky.; Lancaster, Portsmouth, Ohio; Charlottesville, Lynchburg, Roanoke, Va.; Bluefield, Charleston, Huntington, W. Va.; Kingsport, Tenn.

tor switches described in Bulletin L13. They are used to construct switches having from one to three poles per deck or gang.

THE LINCOLN ELECTRIC CO, CLEVELAND 1, OHIO, is making an insulated **electrode holder**, the LJ-1, that is said to combine advantages of tong and hole-type holders. . . . BARBER-COLMAN CO, ROCKFORD, ILL., has developed an electromagnetic **clutch** for machine tool and other type servo-mechanisms.

KEPCO LABORATORIES, INC, 149-14 41ST AVE, FLUSHING, N. Y., is producing the Model 315 **power supply** which features one regulated B supply, one regulated C supply, and one unregulated filament supply. . . . SHALLCROSS MFG CO, COLLINGDALE, PA., has announced a laboratory-type **capacitor analyzer** for determining capacitance values between 5 $\mu\mu$f and 12,000 μf; insulation resistance from 1.1 to 12,000 megohms; also leakage current, dielectric strength, power factor.

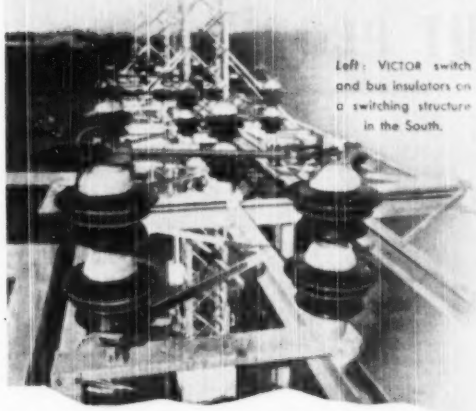
ROCKWOOD SPRINKLER CO, 38 HARLOW ST, WORCESTER 5, MASS., has developed a device which can be inserted in the company's SG-48 **waterfog nozzle** to make five different kinds of discharge from one nozzle; handles any type of fire that water alone or water mixed with Foam liquid will handle. . . . MILLIVAC INSTRUMENTS, P. O. BOX 3027, NEW HAVEN, CONN., has designed the PR6-NL dc **current measuring** device for measurements down to 5×10^{-13} amp and infinite impedance measurements between 1 v and 30 kv.

MINNESOTA MINING & MFG CO, ST. PAUL, MINN., has developed Spherekote tympan and frisket paper (glass-headed paper) that may be used for **insulation** at lower frequencies and voltages, at low humidities. . . . SHEROLITE CHEMICAL CORP, 2201 AMSTERDAM AVE, NEW YORK 32, N. Y., is producing a water repellent **ignition seal**. It is thin liquid applicable to metals and electrical wires or connections by spray or brush; it's said to dry hard in 45 min.

BROWN INSTRUMENTS DIV, MINNEAPOLIS-HONEYWELL REGULATOR CO, 2953 FOURTH AVE, S, MINNEAPOLIS 8, MINN., has announced a 400-c **converter** for use in servo-mechanisms, electronic, and electrical apparatus. . . . DEBOIS CO, CINCINNATI 3, OHIO, is offering an **electrolytic cleaner** called Alkon. It is suitable for either direct or reverse current cleaning of both ferrous and cuprous metals.

MINES EQUIPMENT DIV, JOY MFG CO, DEPT A33, PITTSBURGH 33, PA., is making a vapor-proof **hand lamp** in 60 and 75-w styles.

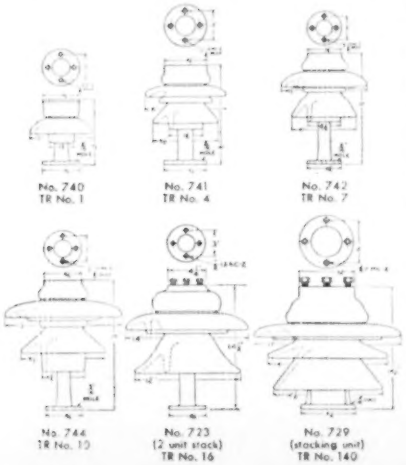
ANOTHER VICTOR INSULATOR THAT SAVES AS IT SERVES



Left: VICTOR switch and bus insulators on a switching structure in the South.

Install VICTOR Switch and Bus Insulators and see how

TROUBLE-FREE PERFORMANCE REALLY PAYS OFF!



No. 740 TR No. 1 — No. 741 TR No. 4 — No. 742 TR No. 7

No. 744 TR No. 10 — No. 723 (2 unit stack) TR No. 16 — No. 729 (stacking unit) TR No. 140

THE number of service-years built into any switch and bus insulator can be determined *only by actual performance data*—data obtained from *all* types of station installations subject to *all* kinds of conditions. And, because of their rugged, heavy-duty construction, that is where VICTOR switch and bus insulators rate *high!* Facts prove VICTOR switch and bus insulators *retain* their original high standards even after many years of severe service. This means *fewer* replacements and *lower* maintenance costs. Find out how much trouble-free performance can *save* you—*standardize* on VICTOR switch and bus insulators.

Ready now! *A new condensed VICTOR Catalog for handy reference. Write today for your copy.*

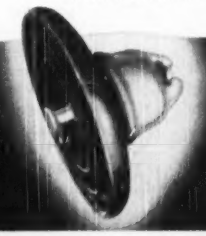
Get All the Facts! **CALL YOUR VICTOR REPRESENTATIVE**

J. A. Perkins Co., *Boston* • T. B. Dolly, *Jersey City* • John J. Herrity, *Washington, D. C.* L. Morris Landers Co., *Atlanta, Charlotte* • Continental Sales & Engineering Co., *Pittsburgh* • Public Service Supply Co., *Cleveland* • H. J. Schwartberg, *Cincinnati* • David D. Schneider, *Louisville* Braisted & Bair, *Detroit* • Homer G. Hall, *Princeton, Ind.* • Gaide & Dunlap, *Chicago* • Alton M. Johnson Co., *Minneapolis* • H. B. Koch, *St. Louis* • Fred B. Hearn, *St. Louis (Affton), Mo.* • Chas. L. Ward Co., *Kansas City, Mo.* • Southwest Sales & Service Co., *Shreveport* • George E. Tarlox, *Denver* Myron Swendson, *Boise* • Maydwell & Hartwell, *San Francisco, Los Angeles, Portland, Seattle.*

Also distributed nationally by Line Material Company

VICTOR INSULATORS Inc.

VICTOR, NEW YORK



Look for this trade mark of enduring service

NEWS ABOUT PEOPLE

Hills New Executive Vice President of Crouse-Hinds; Others Advanced

ALBERT F. HILLS

CARL H. BISSELL

Albert F. Hills, a vice president of Crouse-Hinds Co since 1941, has been elected executive vice president of the company.

At the same meeting of the board Carl H. Bissell, chief engineer, was named vice president in charge of engineering, and F. Ware Clary, manager of publicity, was promoted to vice president in charge of publicity and public relations.

Hills started as purchasing agent in 1901 and later headed sales and commercial affairs. He was made secretary in 1924. From 1943 to 1948 Hills was on the board of governors of the National Electrical Manufacturers Association. He has had the longest company career of any active officer.

Bissell also joined the company in 1901 and has been in the engineering department since then. He has directed development of a number of new products. He is a member of several NEMA committees, the electrical committee of the National Fire Protection Association, and the National Association of Corrosion Engineers.

Clary has been with Crouse-Hinds since 1908 and has directed advertising and public relations for many years. He is a vice president of the Manufacturers Association of Syracuse and a director of the Syracuse Governmental Research Bureau as well as a member of the mayor's seven-man Coordinating Committee for the City of Syracuse.

Subsidiaries of NEES Name New Managers

John T. Costello has been appointed manager of Gloucester (Mass.) Electric Co. He succeeds William N. Flynt, who has been named manager of another New England Electric System subsidiary, Suburban Gas & Electric Co, Revere, Mass. Flynt replaces A. F. Gardella who has retired.

Costello started with Malden (Mass.) Electric Co and joined Suburban in 1922. Most recently he has been assistant to the superintendent of Suburban. Flynt joined NEES in 1930. In 1942 he was assistant resident engineer at Newport, R. I., in building emergency installations for the Navy in connection with New England Power Service Co. and in 1945 he was loaned to the Office of Scientific Research and Development. Later he was a member of the executive staff at the Malden district office.

•

A. B. McClelland, Jr. has been made manager of a new district office opened in New York City by J. F. Pritchard & Co, Kansas City, Mo., engineering and construction firm. The office will serve New York, Connecticut, New Jersey, and eastern Pennsylvania. McClelland spent nine years as a sales engineer for M. W. Kellogg Co and two years as Project Engineering Co sales manager.

GE Apparatus Section Shifts Sales Personnel

Several sales appointments have been made in the Apparatus Department of General Electric.

Four shifts were made to streamline marketing operations of the Lighting and Rectifier Divisions at Lynn, Mass.

Changes Made at Lynn

J. P. Rutherfoord was made assistant manager of sales for the divisions. New sales manager for street lighting and traffic control sales is R. J. Swackhamer. D. T. Carter has been named sales manager for airport and floodlighting sales, and E. W. McKenzie now is assistant to the divisional manager of sales with responsibility for special assignments and advertising and sales promotion.

Rutherfoord joined the Lighting Division in 1938. He has been a district lighting specialist in the Cleveland office, head of the airport lighting section, and sales manager for street lighting and airport lighting. Swackhamer planned the floodlighting systems at Crosley Field, Cincinnati; Ebbetts Field, Brooklyn; Yankee Stadium, New York; Fenway Park, Boston; and Briggs Stadium, Detroit. He also has served as head of the floodlighting section and manager of floodlighting and traffic control sales.

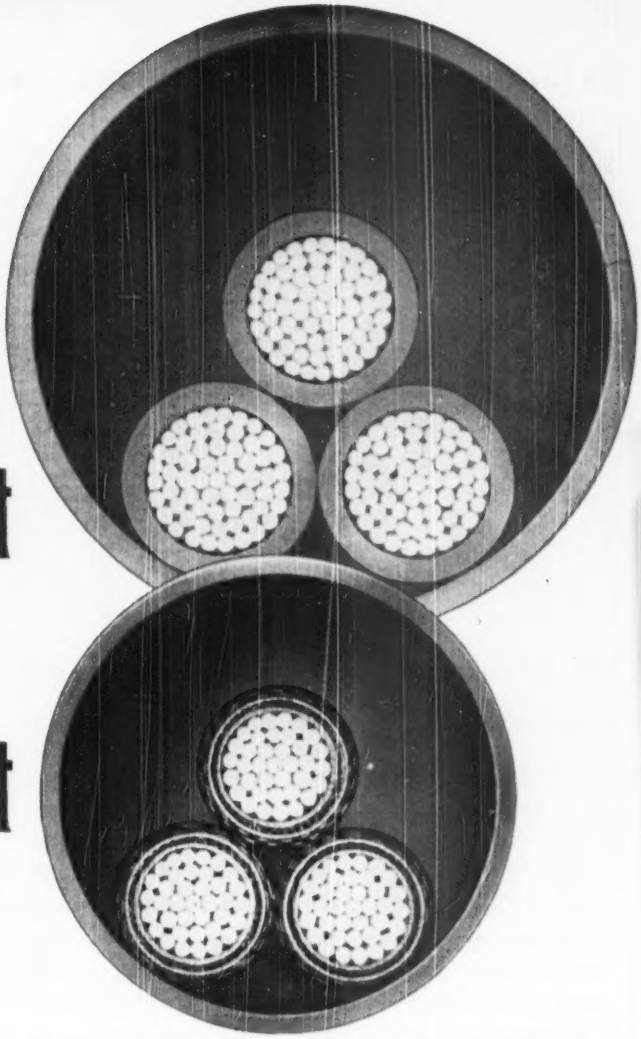
Carter, McKenzie Advanced

Carter joined GE in 1941 as assistant lighting specialist in the San Francisco office. In 1947 he was made district lighting specialist in Seattle. McKenzie started in 1942 as a production worker in the Meter and Instrument Divisions at West Lynn, Mass. He has been general foreman of aircraft instrument assembly and test and supervisor of promotional service in the Lighting and Rectifier Divisions.

Edward A. Green has been appointed staff assistant to A. W. Bartling, general sales manager of the Small Apparatus Divisions with headquarters at Lynn, Mass. He will be succeeded as manager of sales of the Control Divisions by L. Dean Fowler, formerly manager of the San Jose, Calif., motor sales division, Small and Medium Motor Divisions.

Green, who has been with GE since 1924, has served in the Industrial Engineering Divisions and the Motor Divi-

Why Buy 4" Conduit when 3" Conduit will do?



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*with high-rated ROCKBESTOS A.V.C.® and a 430 Ampere Load**

Size for size A. V. C. has a HIGHER AMPERE RATING Hi ...YOUR BEST BUY

- you buy 25% *smaller* conduit
- you use 38% *smaller* cable
- you use *smaller* fittings and lugs
- you have lower labor costs because smaller, lighter cable and conduit are quicker and easier to handle.

To save money specify *permanently-insulated* Rockbestos A.V.C. Write for the booklet "The Story of An Insulation."

*Comparison made with Type RH based on Chapter X, National Electrical Code, 40°C-104°F Ambient

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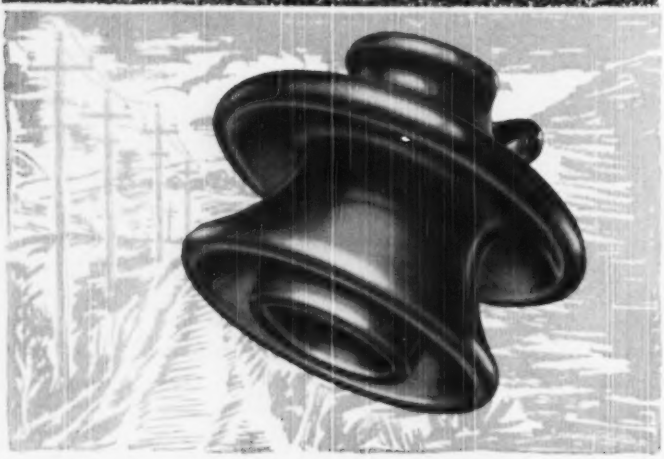
NEW YORK CLEVELAND DETROIT CHICAGO PITTSBURGH ST. LOUIS LOS ANGELES OAKLAND, CAL.

RIGHT *for the* JOB . . . RIGHT ON THE JOB!



To Meet Today's and Tomorrow's Higher Distribution Voltage Needs

More and more companies are using Pinco L 1123's for raising insulation levels on present 6900 and 7200 volt lines and are designing new lines for convenient increase in future operating voltages.

B.I.L. levels require 23 KV lines to have impulse values of 150 KV. The L 1123 one-piece Pin Type meets this requirement perfectly as scores of utilities have discovered. For here is an insulator which will not only meet stepped-up line loads in years to come but will keep maintenance and replacement costs at an absolute minimum.

So when you put up new lines or step up present ones . . . *put up PINCO to be sure!*

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Suspension Insulators . . . Switch and Bus Insulators . . . Distribution Clamps . . . Distribution Pin Types and Guy Strains . . . Transmission Line Fittings . . . Tree Insulators . . . Transformer and Circuit Breaker Bushings . . . One Piece and Multi-part High Voltage Pin Types . . . Suspension and Strain Clamps . . . Indoor Bus Support Porcelain . . . Lightning Arrester Porcelain.

• 1920 Thirty Years Service to the Electrical Industry 1950 •

sions and has been assistant to the manager of each. During World War II he was on the priorities committee and in the production manager's office. With the formation of the Control Divisions in 1947 he was made manager of sales. Fowler also joined the company in 1923, headed automatic switchgear tests, and served as fractional-horsepower motor specialist, Pacific District motor specialist, and general office representative of the motor division. In 1948 he became manager of the Oakland motor sales division of the Small and Medium Motor Divisions and a year later manager of the San Jose motor sales division.

•

New Assignments

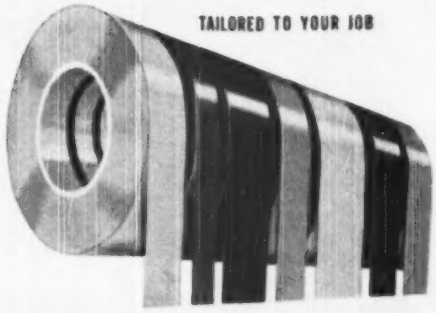
Cannon Electric Development Co has appointed two new plant executives at its Los Angeles factory. **Ray O. Hill** replaces **Anthony Slanga**, resigned, as comptroller. He has held executive accounting posts with Avia Ansco Co, General Analine Works, Porcelain Enamel & Manufacturing Co, Bohn Refrigerator Co, and Philip B. Price, Detroit firm of certified public accountants. **John Trotter** was named production manager to succeed **Richard L. Rowen**, recently elected a vice president. Trotter has worked for Ebasco Services, Inc, Texas Eastern Transmission Corp, Sperry Gyroscope, and aircraft companies. . . **Philip W. Wagner** has been appointed assistant treasurer of Apex Electrical Manufacturing Co, Cleveland. He worked for Republic and Otis Steel Cos before joining Apex in 1943. . . **James E. Reagan** has been named assistant manager in charge of sales promotion and advertising for Ward Leonard Electric Co, Mount Vernon, N. Y. He joined the company in 1937 as sales engineer and handled its sales promotion activities before becoming editor of the house organ in 1945. . . **Howard Graybill** has joined the engineering staff of Railway & Industrial Engineering Co, Greensburg, Pa., as a design engineer on switching equipment. He has worked in the Switchgear Engineering Department of Westinghouse Electric Corp and for New Holland, Pa., Machine Co. . . **Earl Harrell** is the new chief operator of Mountain States Power Co's plant at Bigfork, Mont. He succeeds **A. B. Horstman**, who is retiring.

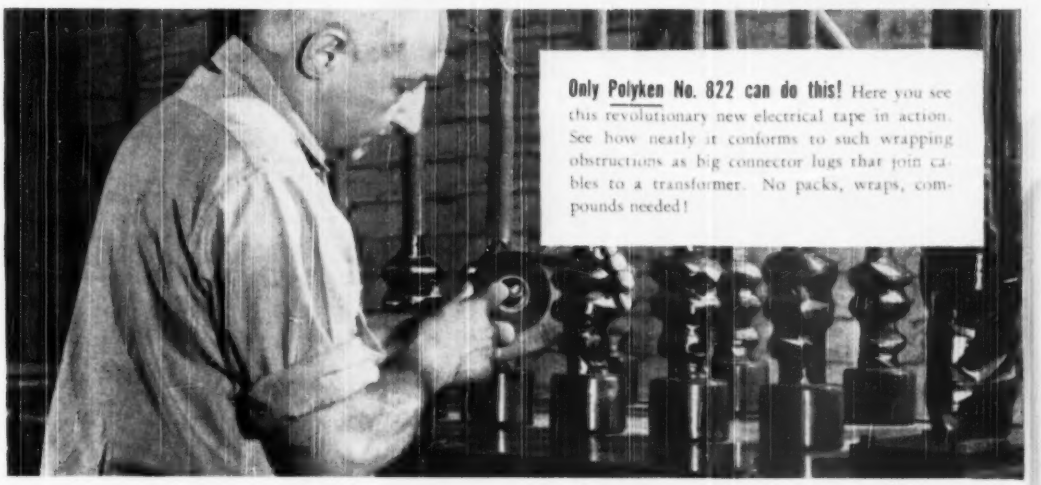
•

Dan Jones Castles has been named system utilization manager of Southwestern Public Service Co, Amarillo, Texas. His job will be to develop commercial, residential, and rural business. Castle has been with Southwestern since 1939, most recently as utilization manager for the Plains Division in Plain-

THE NEW Polyken® INDUSTRIAL TAPES

TAILORED TO YOUR JOB





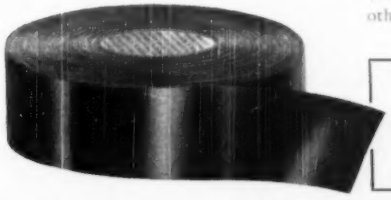
Only Polyken No. 822 can do this! Here you see this revolutionary new electrical tape in action. See how neatly it conforms to such wrapping obstructions as big connector lugs that join cables to a transformer. No packs, wraps, compounds needed!

Now wrap high-tension cables in ONE easy step!

Until *Polyken* No. 822 was developed, wrapping high-tension cables was a two-step job. First, a rubber splicing compound, followed by an outer wrap of friction tape.

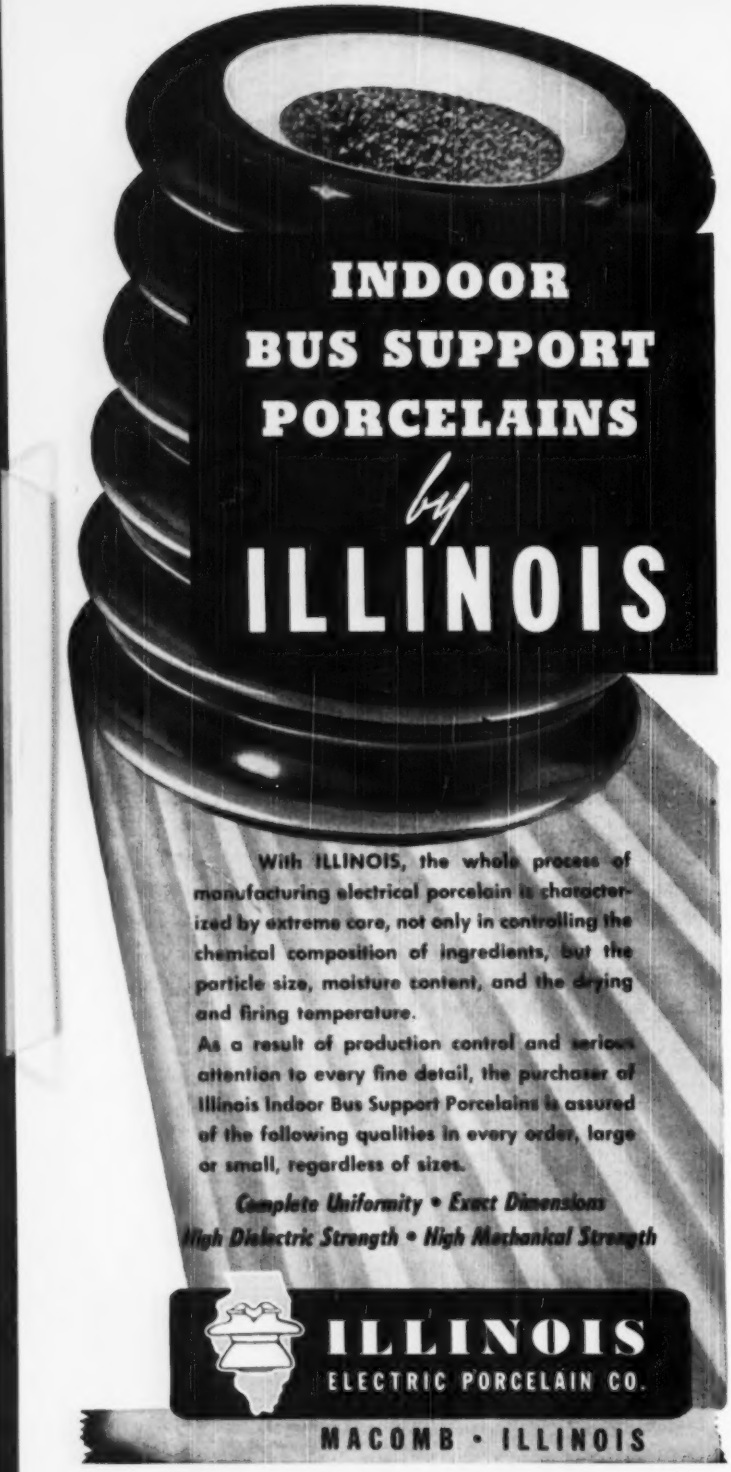
Now you can forget about the rubber compound! *Polyken* Electrical Tape No. 822 is only 9 mils thick—but it's 10,000 volts strong (dielectric strength). Makes *one* quick operation out of two tedious ones with no sacrifice of efficiency.

No. 822 is the only oriented polyethylene tape with a successful pressure-sensitive adhesive. Stretches both ways, so that it covers rough and irregular surfaces. High moisture resistance. Solvent proof. Corrosion proof. For splicing, wrapping, insulating, corrosion coating of cables, wires, controls, pipes, conduits, and hundreds of other uses. Write for free samples today!



GET FREE SAMPLES of *Polyken* No. 822, plus complete specifications and engineering data. Write *Polyken*, Dept. EW-2, 222 West Adams Street, Chicago 6, Illinois.

Polyken Industrial Tape, Department of Bauer & Black, Division of The Kendall Company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BUS SUPPORT
PORCELAINS
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ILLINOIS
With ILLINOIS, the whole process of manufacturing electrical porcelain is characterized by extreme care, not only in controlling the chemical composition of ingredients, but the particle size, moisture content, and the drying and firing temperature.
As a result of production control and serious attention to every fine detail, the purchaser of Illinois Indoor Bus Support Porcelains is assured of the following qualities in every order, large or small, regardless of sizes.
Complete Uniformity • Exact Dimensions
High Dielectric Strength • High Mechanical Strength
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ELECTRIC PORCELAIN CO.
MACOMB • ILLINOIS

view, and in the electric utility field for 17 years. From 1933 to 1939 he was on the sales and lighting staff of West Texas Utilities Co at Abilene.

Almer Skretting has been appointed assistant sales manager and **Glenn R. Black** superintendent of industrial sales of Wisconsin Electric Power Co. Skretting has been with the company since 1922, most recently as superintendent of industrial sales. He is a past president of the Great Lakes Power Club and active in industrial power groups of Edison Electric Institute and Wisconsin Utilities Association. Black started with the company in 1928 as a junior engineer. He was engaged in power sales and water heater sales work and has been assistant superintendent of industrial sales since 1948.

William F. Tremmel, manager of production planning for the Lamp Division of Westinghouse Electric Corp since 1947, is retiring after 33 years with the company. He started in Bloomfield, N. J., as a production clerk and served as service manager of several lamp warehouses and as manager of the lamp stocks and distribution department.

John C. Murphy has retired as attorney of Commonwealth Edison Co, Chicago. He began with Cosmopolitan Electric Co in 1911 and became assistant to the general attorney when that company was consolidated with Edison in 1913.

Harold H. Rudd, vice president and consulting engineer at Railway & Industrial Engineering Co, Greensburg, Pa., has retired. He spent 15 years with Westinghouse Electric Corp before joining R&IE in 1913 as sales manager. Later he switched to engineering and planning. Holder of a number of patents, he developed the line of interlocks for the Kirk Key Interlock System and R&IE's construction of isolated phase work and was responsible for research on switch contacts. He has been active in the development of industry standards.

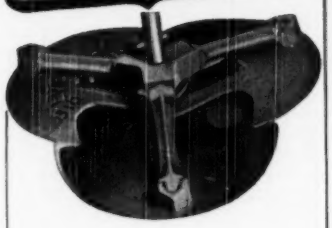
OBITUARY

Harcourt A. Morgan

Dr Harcourt A. Morgan, 82, member of the initial board of directors of the Tennessee Valley Authority and later chairman, died in Belfast, Tenn., Aug 25.

A native of Canada, Morgan was best known as an entomologist, zoologist, and horticulturist. As a staff member of the Louisiana State University Agricultural Experiment Station, director of

EVERSTICK ANCHORS...



FIRST CHOICE
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- PERMANENCE
- HOLDING POWER
- LONG LIFE
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They speed up work and provide dependable anchorage in new construction and maintenance. Quick and easy to install — made of tough rust-resistant malleable iron — their holding power "tops" all others. Available two-way, three-way, four-way and cone types. Write for facts.

Exclusive Everstick nut housing. Locks anchor firmly on rod. No chance of rod slipping thru anchor.

EVERSTICK ANCHOR CO.
Manufacturer of
"THE ANCHOR OF MERIT"
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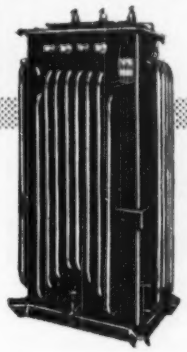
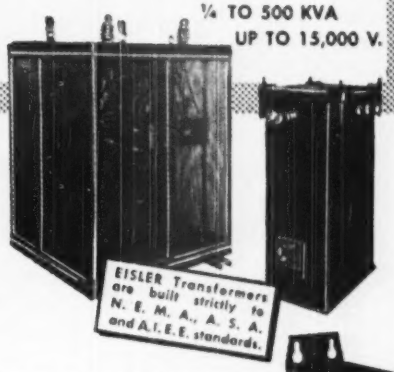
EISLER TRANSFORMERS
STANDARD • SPECIAL
AIR • OIL • WATER-COOLED

for

POWER DISTRIBUTION • LIGHTING • AUTO • ELECTRIC FURNACE • HEATING • PHASE CHANGING • WELDING • GENERAL PURPOSE

¼ TO 500 KVA
UP TO 15,000 V.

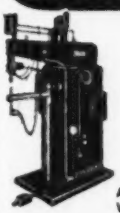




In addition to the manufacture of standard transformers the Eisler organization is especially well adapted to design and build transformers to the customer's specifications when departure from standard construction is desired. Send in your specification for quotations.

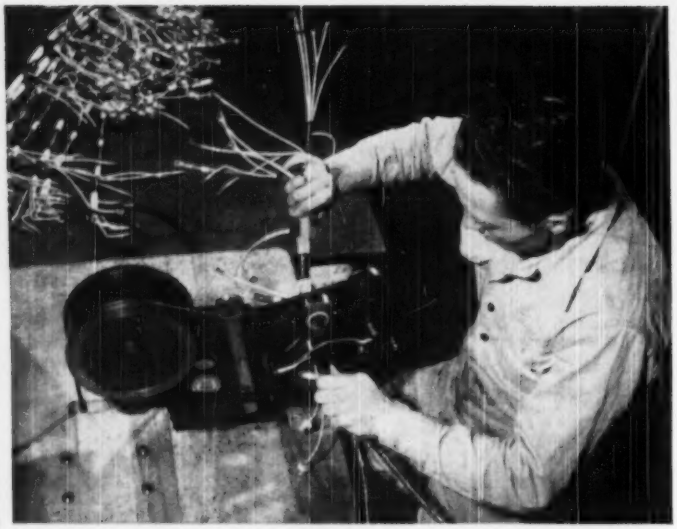
SEND FOR NEW CATALOG TR-50

EISLER RESISTANCE WELDERS
SPOT • BUTT • GUN • SEAM



A complete line of Resistance Welders from ¼ to 300 KVA for all types of welding.

CHAS. EISLER, Pres.
EISLER ENGINEERING CO. INC.
769 SOUTH 13th ST. NEWARK 3, N. J., U. S. A.



POWER TAPER wraps Kenworth Truck ignition harness with "SCOTCH" No. 33 Tape.

Now...plastic tape battles weather all over the world!

QUICK FACTS ABOUT "SCOTCH" No. 33 Electrical Tape

- **TOUGH**—plastic backing is abrasion resistant, unaffected by water, oil, alkalies, alcohols, sunlight.
- **HIGH DIELECTRIC**—over 7,000 volts.
- **THIN CALIPER**—only .007 inch thick.
- **STRETCHY**—conforms snugly to uneven surfaces, odd shapes.
- **NON-CORROSIVE**—contains no sulphur-bearing compounds.

REMEMBER—for permanent high-heat insulation use "SCOTCH" Electrical Tape No. 27. Glass-cloth backing, thermo-setting adhesive. Whatever your insulating problem, one of the many "SCOTCH" Electrical Tapes can save you time and money. Write today for all the facts!

Ignition harnesses on Kenworth Trucks from South Africa to British Columbia wrapped with "SCOTCH" No. 33 Electrical Tape

Huge Kenworth Trucks need rugged insulation to operate in practically every climate in the world. That's why the manufacturers wrap ignition harnesses with "SCOTCH" No. 33 Electrical Tape. The smooth, plastic backing of this easy-to-apply tape gives a neat seal that resists sunlight, rain, snow and ice. Trucks keep rolling!

Why not let us show you the right "SCOTCH" Electrical Tape for your insulating problem? Just write Dept. EW-95 for complete information. No obligation, of course.

Made in U.S.A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn., also makers of other "Scotch" Brand Pressure-sensitive Tapes, "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing, "3M" Abrasives, "3M" Adhesives.

General Export: Durex Abrasives Corp., New Rochelle, N. Y.
In Canada: Canadian Durex Abrasives Ltd., Brantford, Ontario.

the University of Tennessee's station, Tennessee state entomologist, and dean of the College of Agriculture at the University of Tennessee, he was active in experiments for control of the boll weevil and helped set up Kingsport, Tenn., a planned industrial city in which factory workers lived on farms.

Morgan was president of the University of Tennessee when Franklin D. Roosevelt appointed him to the board of TVA in 1933 along with Dr Arthur E. Morgan, chairman, and David E. Lilienthal. H. A. Morgan served as chairman of TVA from 1938 to 1941 and was succeeded in that post by Lilienthal.

•

Hugo E. Eisenmenger

Hugo E. Eisenmenger, 76, retired electrical and mechanical engineer and former rate expert with Consolidated Edison Co. died Aug 28 in Mount Kisco, N. Y.

A native of Austria, Eisenmenger operated marine engines for the North German Lloyd Steamship Line before going to Khartoum to build an electric plant for the British and Egyptian governments. Later he was Tokyo representative of the Berlin Bergmann Elektrizitatswerke.

After coming to the United States Eisenmenger served as assistant to the chief engineer of the General Electric Co National Lamp Works in Nela Park, Cleveland. He joined Con Ed in 1921. Eisenmenger was the author of *Central Station Rates in Theory and Practice* and a number of articles in technical journals including ELECTRICAL WORLD.

•

John S. Parsons

John Selby Parsons, Westinghouse Electric Corp distribution engineer and inventor, died Aug 22 in Pittsburgh.

Parsons helped develop modern electrical distribution methods for urban areas. He designed the first network relays and the pump-proof network protector. More than 40 patents, mainly on substation and network distribution systems, were granted to him. One of the authors of the Westinghouse Transmission and Distribution Reference Book, he published more than 40 technical articles.

After joining Westinghouse in 1921 Parsons worked in the Relay Engineering Division. In 1930 he moved to the central station department, specializing in problems of electric power distribution. Recently he had been an advisory engineer to the company and its customers and had acted as a consultant in municipal planning for several South American countries. He received the Westinghouse Award of Merit in 1938.

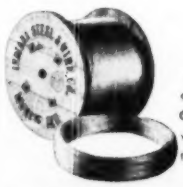
Combines All Four

EVERY requisite that sound construction needs demand are combined in *Crapo* Galvanized Steel Strand—

1. High strength
2. Ruggedness
3. Long life
4. Economy

The superior tensile strength inherent in steel is utilized to fullest advantage in each size and grade of this time-proved strand. The heavy, ductile, tightly-adherent galvanized coating—applied by the famous *Crapo* process—provides dependable protection to the steel, extends the life of the strand beyond the normal period of replacement.

Specify *Crapo* Galvanized Steel Strand for guys, messenger and overhead ground wires! There is a size and grade for every practical need available for prompt shipment.



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Consult your nearest distributor of *Crapo* Products or write direct for further information!

INDIANA STEEL & WIRE CO.
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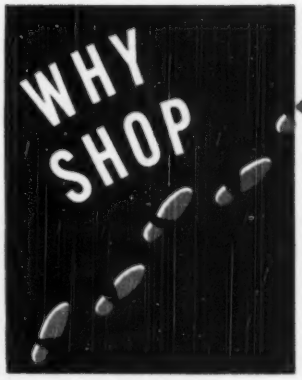

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THE SUPERIOR ELECTRIC COMPANY HAS A STABILINE FOR YOUR NEEDS

If you're looking for dependable automatic voltage regulation, investigate STABILINE first. You'll save time and money — you'll get longer service through better design and construction — you'll get performance and operating characteristics as advertised.

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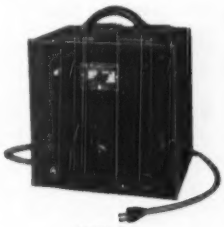
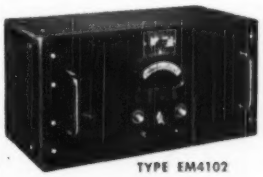
STABILINE Type IE is instantaneous and completely electronic in action. Keeps output voltage to within ±0.1% of preset value regardless of wide line variations; to within ±0.15% regardless of load current or power factor changes. Waveform distortion *never* exceeds 3%. STABILINE Type IE is available in cabinet or rack mounting models — in numerous ratings.



TYPE IE PORTABLE



TYPE EM4102

STABILINE Type EM (Electromechanical) features zero waveform distortion, insensitivity to magnitude and power factor of load, no effect on system power factor; no critical adjustments. It is available in output ratings up to 100 KVA — for single and for 3 phase operation.

STABILINE Types IE and EM perform "as advertised". Each and every STABILINE Automatic Voltage Regulator is inspected and tested to the most rigid specifications. If — after you purchase a model of either type — you would like a copy of the inspection and test report, write us and a full report will be sent promptly.

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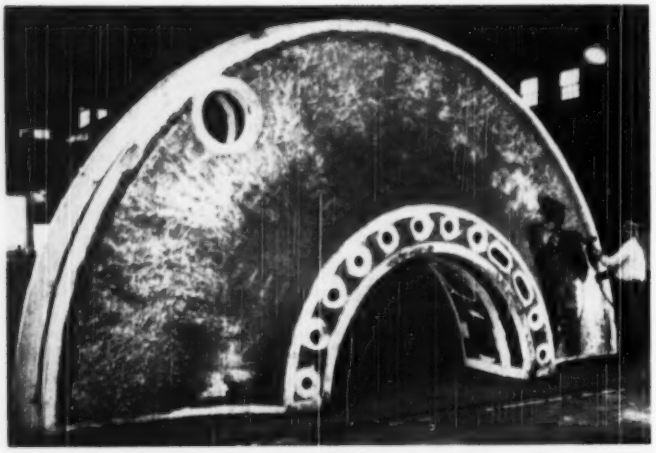
MANUFACTURERS and MARKETS



MORE POWER is on the way for TVA. This rainbow-shaped steel casting, half an inner cover plate for a turbine, is being dressed with a pneumatic hand grinder at Bethlehem Steel Co's Bethlehem, Pa., plant. Section, 25 ft 6 inches in diameter, weighs 66,000 lb. It is a component of an additional hydro-electric generating unit for Pickwick Dam

Booming TV Set Sales Push Sylvania Profit Up

Soaring demand for television sets was given credit for a jump in six-month net earnings of Sylvania Electric Products, Inc, from $1,555,067 in 1949 to $2,259,453 in 1950.

The 1950 consolidated net income was equal to $1.41 a share of common stock, compared to 93¢ a share last year. Net sales to June 30, 1950, were $61,086,101, compared to $49,665,548 for the six months ended June 30, 1949, an increase of 23%.

Net earnings for the second quarter were $1,033,609, or 64¢ a share. This compares to consolidated net income of $378,252, or 19¢ a share, for the same period in 1949. Second quarter net sales were $31,738,190; last year they totaled $22,556,653 in the second quarter.

Almost every division of the company showed an improvement in sales over the first half of last year. Radio and picture tube sales have been hitting monthly highs, with monthly orders continuing to exceed shipments. June was the largest month of the year for new business.

Less than the normal seasonal decline was predicted for the third quarter. "Incoming orders were strong for this time of year even before the Korean war began, and since then they have been much heavier," the company said. Last year summer sales were off more than seasonally.

•

Westinghouse Net Income Down in Second Quarter

Labor troubles dropped Westinghouse Electric Corp's profits and net sales billed for the second quarter of 1950 below those for the same period a year ago.

Second quarter net income was $15,316,330, or 99¢ a share, compared to $17,543,040, or $1.31 a share last year. Net sales billed for the second quarter this year were $239,973,489 as against $241,415,260 a year ago.

For the first six months of 1950 net income totaled $27,206,707. This was equal to $1.86 a share or 5.9% of net sales billed. Total of net sales billed was $463,907,387, compared to $468,073,982 in the first half of 1949. For the first six months of 1949 net income was $28,409,961, equal to $2.10 a share or 6.1% of net sales billed.

Production and earnings in the second quarter would have been ahead of 1949 except for work stoppages and slowdowns costing approximately 133,800 man-days, Pres Gwilym A. Price said. Since the recent signing of a "partial agreement" with IUE-CIO production has proceeded almost without interruption. New union contracts are being negotiated with IUE and with UE, which represents some plants.

•

Consumer Boycott Ruled Legal under Taft-Hartley

A consumer boycott, peacefully conducted by a union, does not violate the Taft-Hartley Act. The National Labor Relations Board so ruled in directing Hoover Co, Canton, Ohio, to reinstate 12 local executive board members of the United Electrical Workers, then CIO, whom it had discharged following a two-month strike in 1948.

The union leaders had sponsored the boycott in the midst of the strike. They refused a company request to call it off afterward, although there was no overt support of the boycott once the strike had ended.

MANUFACTURING BRIEFS

Television production is being expanded in the Chicago area. Motorola, Inc, has leased and rehabilitated a 200,000-sq-ft building which will make combination radio-TV sets, employing about 1,200 people when in full production. Zenith Radio Corp has consolidated production of television and radio components in a newly acquired two-story plant. The building provides 185,000 sq ft of additional production space and has 300,000 sq ft of land available for future expansion.

Operation of the federal tin smelting plant at Texas City, Texas, will be continued through June 30, 1956, under a bill recently signed by President Truman. The new legislation extends authority of the Reconstruction Finance Corporation to operate the tin smelter until that date. Previous authority would have expired next June 30.

A Mobilization Planning Committee has been formed in the Apparatus Department of General Electric Co, with

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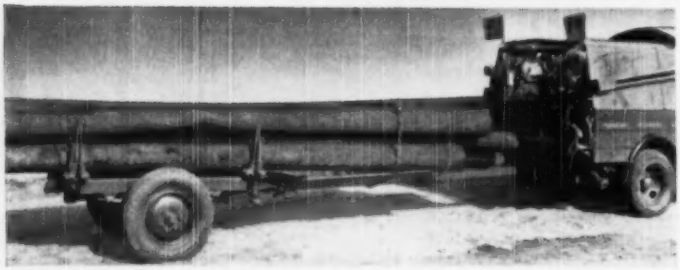
HIGHWAY
POLE TRAILERS



Strength for heavy loads— Economy handling for light loads

Here's one very versatile model from Highway's complete line of Utility Trailer Equipment and accessories. Its light weight means economy on average or light loads, its strength means it can carry the occasional heavy load of poles. Other hauling needs are cared for by its steel floor and optional side and end panels. Standard equipment includes a load binding winch mounted on rear cross member, a king pole binder on front cross member, and four cam lock sliding stanchions. Ask for our catalog for complete description and specifications.

Pole and General Purpose Trailers

Light two-wheel units, sturdy in construction and especially designed for use with one-half ton trucks equipped with pick up bodies, installation or service bodies. Also hauls cross arms, insulators, wire, and pole line hardware—even brush.

Combination Pole and Cable Reel Trailer

Bolsters with sliding cam locking stanchions quickly mounted or unmounted. Cable reel saddles securely attachable at moment's notice. Handles cable as effectively as standard cable reel trailers. Quickly adjustable to different width reels.

Standard Cable Reel Trailer

For loading and transporting heavy and unwieldy reels of cable. Quick loading, with low center of gravity for safe transportation at high speeds. Saddle guides quickly adjustable to different width reels. Safety rope and attaching parts are standard equipment.

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PLANTS AT EDGERTON, WISCONSIN — STOUGHTON, WISCONSIN
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Manufacturers of Utility Truck Bodies • Earth Boring Machines • Pole and Cable Reel Trailers • Winches • Power Take-offs • Service Accessories

Neil Currie, Jr., administrative assistant to the department's general manager, as chairman. Responsibility of the group is to coordinate "requests from the Department of Defense and its agencies for information concerning facilities, personnel, possible production schedules, and other matters of material procurement planning for national defense."

Westinghouse Electric Corp is nearing peak production at its new plant near Irwin, Pa. The plant is processing mica insulation for electrical equipment and is making Thermalastic, Westinghouse's new insulating material for large steam-driven generators.

Kennecott Copper Corp is getting a new $16-million refinery at Garfield, Utah, into operation. Initial capacity will be 12,000 tons of refined copper a month, cast as wire bars, ingots, and ingot bars.

SALES ASSIGNMENTS

COMPANY STAFFS

General Electric Co has appointed Charles Stoeckly manager of sales for the Motor Divisions, with headquarters in San Jose, Calif. He replaces Dean Fowler, who will become manager of sales for the Control Division in Schenectady, N. Y.

Westinghouse Electric Corp has put George Skipton in charge of all company activities having to do with supplying electrical apparatus to the city and county of San Francisco. Skipton has been application engineer for the transportation division in San Francisco since 1922.

Lincoln Electric Co has appointed A. F. Boucher Detroit district manager. He has been district manager in Milwaukee since 1947. I. R. Bartter, who has been district manager in Grand Rapids, Mich., has been transferred to Milwaukee.

Reliance Electric & Engineering Co. Cleveland, has added Frank W. Leitner to its sales engineering staff. From the office in Charlotte, N. C., he will act as sales engineer for all Reliance products in North and South Carolina.

Moloney Electric Co. St. Louis, has added R. C. Schmitz to its New York City sales office at 55 Liberty St.

Brown Co. New York City, has named Herbert V. Fackler field representative in the Southwestern area.

Worthington Pump & Machinery Corp. Harrison, N. J., has named William A. Meiter to a newly created position of central sales manager. He will direct sales of the Buffalo, Detroit, Cleveland, Cincinnati, and Pittsburgh offices. John W. Stovall will succeed Meiter as manager of the Buffalo district office.

Allis-Chalmers Manufacturing Co. Milwaukee, Wis., has made Joseph Varacalli dealer sales supervisor for the Empire

TIGHT CONNECTIONS *assured by using* PALNUT SELF-LOCKING NUTS

• The Railway & Industrial Engineering Co. overlooks no details to insure years of satisfactory service from its products. An example is the use of PALNUTS to assure permanently tight nut-and-bolt assemblies on its line of fittings, switches, clamps, cutouts and other R. & I. E. equipment.

TIGHT connections are vital in the distribution and transmission of Power. That's why you see PALNUTS on wood pole lines, steel transmission towers, bus fittings, connectors, switchboards, terminals, substations and other electrical equipment.

PALNUTS apply quickly on top of regular nuts, holding them to original tightness under severe vibration. No check-ups or re-tightening are required. On electrical connections, perfect conductivity is maintained. PALNUTS are available in a wide range of sizes in plain spring tempered steel; also hot-dip galvanized and silicon bronze for weather resistance. Send details of your needs for samples. Write for literature on entire line.

THE PALNUT CO.

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MARCUS DRY TYPE TRANSFORMERS *exclusively!*

THE MARK OF QUALITY

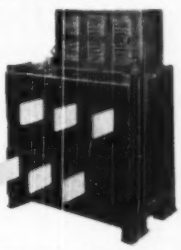
MTC

TYPE ACO

All purpose, indoor or outdoor, dry type distribution transformers. Sizes to 100 KVA, voltages to 5000 V.

TYPE C

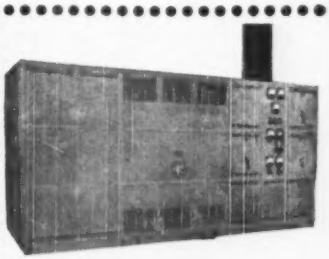
General purpose transformers, 600 volts and below; 1-15 KVA inclusive, single or three phase completely self contained.



FURNACE TRANSFORMER

3 PHASE, 3/2 PHASE, 1 PHASE

Uses—Forging, heat treating, melting, resistance heating, welding, etc.



TYPE F - UNIT SUBSTATION

1000 KVA, 4160Y 60 Cycles, 3 Ø —480 delta; Fused, load interrupter on H.V. (left). Drawout type breakers and metering equipment on L.V.

ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DRY TYPE TRANSFORMERS EXCLUSIVELY

1 to 2,000 KVA up to 15,000 Volts to meet Individual Requirements

- DISTRIBUTION
- GENERAL PURPOSE
- UNIT SUBSTATION
- PHASE CHANGING
- ELECTRIC FURNACE
- RECTIFIER
- WELDING
- MOTOR STARTING
- SPECIAL

MTC produces a complete line of quality transformers to 2000 KVA. A newly expanded plant with the most modern equipment, plus a background of years of dry type specialization, assures maximum transformer value.

NEMA

MARCUS TRANSFORMERS CONFORM TO THE STANDARDS OF N.E.M.A. AND A.I.E.E.

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TRANSFORMER CO.
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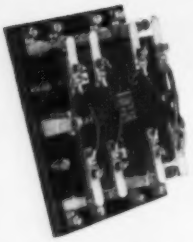
30 MONTGOMERY STREET
HILLSIDE 5, NEW JERSEY

PIONEERS IN THE FIELD OF AIR COOLED TRANSFORMERS

Multi-Contact RELAYS for Specialized Controls



featuring Mechanical locking, no latching.
Single solenoid action with integral control contacts permitting circuit connections equivalent to a two-coil unit.
Wiping and adjustable contacts for reliable service at milliamperes of load at low voltage or at full rating.

rated at 10 and 25 amperes; AC to 550 volts; DC to 250 volts.

in three available combinations
10 amperes to 12 poles normally open and 12 poles normally closed or any combination of normally open and normally closed poles. 550 volt AC maximum.
10 amperes to 6 poles normally open and 6 poles normally closed or any combination of normally open and normally closed poles. 250 volt DC maximum.
25 amperes to 6 poles normally open and 6 poles normally closed or any combination of normally open and normally closed poles. 250 volt DC. 550 volt AC maximum.

Do you require a sturdy reliable RELAY to maintain circuit control regardless of momentary interruption in control line due either to low voltage or associated relay operating time? Do you need a RELAY to provide "memory" circuits or to permit preset control operations? Utilities have found them very useful in combination for AC service on contacts, DC operating coil. Control systems needed for many machine tools, industrial machines and furnaces will find such a RELAY in this special ASCO design. And when the AC hum of a magnetically-held relay would be a nuisance, this mechanically held ASCO RELAY would be ideal.

In writing for further information, write us fully about your requirements.

AUTOMATIC TRANSFER SWITCHES • REMOTE CONTROL SWITCHES • CONTACTORS • RELAYS

We also manufacture a complete line of Solenoid Operated Valves for Automatic and Remote Control of Liquids and Gases

ASCO Electro-Magnetic CONTROLS

Automatic Switch Co.

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A REPORT TO THE FIELD—
"CARE & MAINTENANCE OF TRANSMISSION TOWERS, SUBSTATIONS & EQUIPMENT"

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A graphic report to the industry about rust—its control and prevention—is now available. After years of research and extensive field testing, this brochure presents an intelligent solution to the problem of rust in the Light and Power industry.

This is a valuable and accurate report for all men working in this field. Get your copy at once.

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INTERNATIONAL RUSTPROOF CORPORATION
CLEVELAND 7, OHIO

region with headquarters in New York City. He succeeds J. R. Queen, who resigned to join the Columbia Machine & Engineering Co, Hamilton, Ohio. The region includes the New York, Buffalo, Newark, Rochester, and Syracuse district offices.

Graybar Electric Co. New York, has appointed two new branch managers. J. W. Horne will direct the Memphis branch, succeeding C. E. Kirkpatrick, now district manager at Cleveland. William McNulty will head the Syracuse, N. Y., branch.

REPRESENTATIVES

Nickel Cadmium Battery Corp. New York City, has appointed J. R. Collins, Statler Building, Boston 16, Mass., New England sales representative. Collins will specialize in sales of storage batteries for electric utility applications.

General Lighting Co. New York City, has appointed Edward Allman, 226 Greenbriar Lane, Harristown, Pa., representative for the metropolitan Philadelphia area. Carl H. Krause, 4875 Belding Rd, Rockford, Mich., was appointed representative in Michigan, and Len Ferman, 19187 Mitchell Ave., Rocky River, Ohio, for Nebraska, Missouri, and Kansas.

Newport News Shipbuilding & Dry Dock Co. Newport News, Va., has appointed Hooper-Green Co, Chicago and Indianapolis, as Midwest sales representative. J. G. Green, 407 South Dearborn St, Chicago, heads the company, and A. J. Stone, 2313 East Michigan St, is district representative in Indianapolis. They will represent Newport News in sale of all its products except ship work in Indiana, Illinois, southwestern Michigan, and a portion of Wisconsin and Iowa.

R-B-M Manufacturing Co. Logansport, Ind., has appointed Harold F. Barnes Ohio sales representative. His office is at 410 West First St, Room 306, Dayton. Jim Kress, 3435 Chouteau Ave., St. Louis, is handling sales in that area.

Springfield Boiler Co. Chicago, has appointed Charles W. McHose, 92 Liberty St, New York 6, N. Y., to handle sale of water tube boilers, steam generators, and superheaters for high pressures and superheat in New York City and surrounding territory.

Standard Transformer Co. Warren, Ohio, has appointed John G. Gaines Co, 2201 Grand Ave, Kansas City 8, Mo., exclusive representative for Kansas and western Missouri.

Kuhlman Electric Co. Bay City, Mich., has named Donald J. Byrne, 760 Winona Blvd, Rochester, N. Y., as sales agent in New York state except for the metropolitan area south of Poughkeepsie.

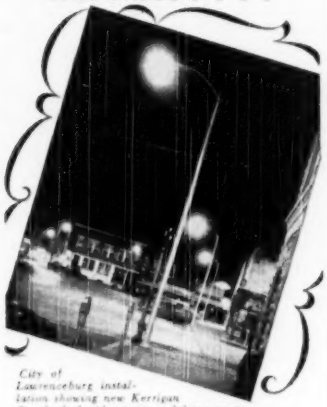
Pittsburgh Reflector Co. Pittsburgh, has appointed John G. Gaines & Co, Merchandise Mart, 2201 Grand Ave, Kansas City, Mo., Permaflector engineers for Kansas and western Missouri.

C. P. Clare & Co's district sales office of R. L. deVeer has been moved from Boston to 82 Broadway, Cambridge 42, Mass.

Swartwout Co. Cleveland, has named Industrial Sales & Engineering Co, Memphis, sales representatives for the area. Power plant equipment representative in Albuquerque, N. M., will be Albuquerque Engineering Co.

Your Town

can Have Beautiful WELL-LIGHTED STREETS with KERRIGAN STANDARDS Like These . . . .



City of Lawrenceburg installation showing new Kerrigan Standards beside antiquated lamp posts

. . . . With KERRIGAN Weldforged LIGHTING STANDARDS, designed and engineered to make night-driving in your town just like day . . . Standards that meet the highest engineering standards for highway and street lighting.

. . . . Notice what one progressive Tennessee town did to light its streets; then check the Kerrigan specifications below to see how much more Kerrigan Standards offer you.

- ✓ Shafts (20', 25', & 30') and Mast Arms (4', 6', 8', 10', 12' & 15') to conform to I.E.S. recommendations.
- ✓ Continuous Tapered Octagon shafts from open hearth steel.
- ✓ Heavy steel construction for maximum strength.
- ✓ Detachable mast arms, brackets, and transformer bases for easy installation and maintenance.
- ✓ Ornamental scroll braces for beauty AND strength.
- ✓ Mechanical priming at factory with red oxide (inside and out) for longer life. Finish coat can be easily applied after standards are in place.
- ✓ Special designs to meet ANY and ALL special requirements. CONSULT THE KERRIGAN ENGINEERING DEPARTMENT.

WRITE NOW (on your letterhead please) for your **FREE COPY** of our Kerrigan Lighting Standard booklet A1A which gives you detailed specifications and catalog information.

— Write —

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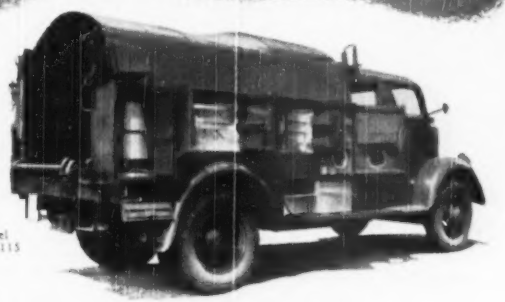
YORK-HOOVER

Bodies are BETTER SERVICE Investments



Model MCW-115

LINE CONSTRUCTION BODY A tough, fully equipped body that will do, economically, all the jobs required in line construction and maintenance work. Model MCW-115 is an investment in *better service* that will earn *regular dividends* for you.

Model 4978

LIGHT DUTY SERVICE BODY Designed for installation on a standard ½ ton chassis. All material and tools for light duty work are conveniently located—in logical sequence and available for daily inventory. Write for Bulletin 927 today!

YORK-HOOVER BODY DIVISION YORK, PENNA CORPORATION

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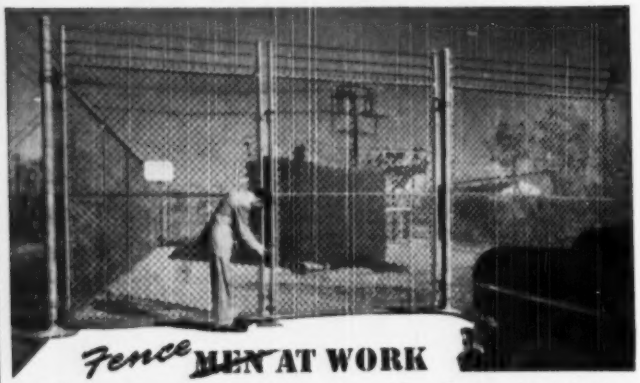

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Write to PAGE FENCE ASSOCIATION in Monessen, Pa., Atlanta, Bridgeport, Chicago, Denver, Detroit, Los Angeles, Philadelphia, Pittsburgh, New York or San Francisco.

PRODUCT OF PAGE STEEL & WIRE DIVISION OF AMERICAN CHAIN & CABLE COMPANY, INC.

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A CF&I PRODUCT

LOOK... FOR THE YELLOW TRIANGLE—

a symbol of Wickwire Quality when you're buying wire rope. It's your assurance of utmost stamina and uniformly dependable performance ... longer, more economical service on the job.

Write for free copy of "Know Your Ropes" —82 pages of helpful information on selection, application and correct usage of wire rope. Address your request to: Wire Rope Sales Office, Palmer, Mass.

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BRANCHES & DISTRIBUTORS IN KEY CITIES EVERYWHERE

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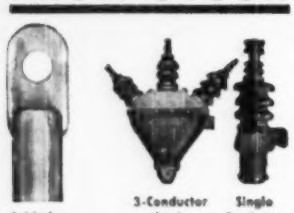

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NEW ELECTRICAL CONSTRUCTION

NEW ELECTRICAL construction projects announced by private and government utility systems involving more than $70,000. Also listed are major industrial and construction jobs where electrical work is included

UTILITIES

Proposed Construction

Alabama and Florida—Alabama Power Co., 600 N. 18 St., Birmingham, Ala., electrical transmission line from Mobile, Ala., to Pensacola, Fla., $1,000,000.

Ala., Gorgas—Alabama Power Co., 600 N. 18 St., Birmingham 7th unit, steam generating plant, $10,000,000.

Arizona-California-Nevada—Bureau Reclamation, Dpt. Interior, Boulder City, Nev., installing turbines, transformer and appurtenant equip. for Units A2, A4 and A9; relocation of transformer bank "Y" and constr. addnl. transformer circuits and terminal facilities for Hoover switchyard at Hoover Power Plant, Boulder Canyon Proj. Spec. 3137, Michael W. Straus, comr.

Ill., Chicago—City, City Hall, Zone 2, Contr. 3, paving and utilities for Section Finger B, airport, O'Hare Field, $300,000. Plans deposit $100. Ralph H. Burke, 20 N. Wacker St., Chicago, Zone 6, engr.

Mich., Lansing—State, Lester J. Maitland, dir., State Dpt. Aeronautics, Capitol City Airport, installing light sys., 70,000 lin. ft. underground cable, intensity runway lights, 60 beam runway lights, electric transformer vault, airport work etc. Plans deposit $5 no refund.

North Dakota—Bureau Reclamation, Dpt. Interior, Bismarck, current and potential transformers for Dakota, Carrington, Valley City, Edgeley, Forman, Leeds, Bisbee, and Rolla Sub-stations, Central North Dakota Power Sys., Missouri River Basin Proj., Spec. R6-602-19 (Region 6) L. N. McClellan, Bldg. 1-A, Denver Federal Center, Denver, Colo., ch. engr.

North Dakota—Bureau Reclamation, Dpt. Interior, Bismarck, construct 10,000 kva Carrington, 20,000 kva Edgeley, 10,000 kva Forman substations, Spec. R6-48 (Region 6), Missouri River Basin Proj. Transmission Div.

Tex., Roma—International Boundary & Water Comn., U. S. and Mexico projected Proj., 1st. Natl. Bank Bldg., El Paso, rolled earth type Falcon Dam Proj. 52 ft. high, 19,000 lin. ft. long. Approx. $50,000,000, electric power plant, $15,000,000.

Utah, Salt Lake City—Utah Power & Light Co., Kearns Bldg., 75,000 kilowatt steam turbo-generator electric power plant $10,500,000. J. A. Hale, c/o owner, ch. engr.

Greece—State Electric Utility Co., Greek Government, Athens, plans underway nation wide public utility system, incl. 68,000 kw. thermal plant at Alviveri, on Island of Euboea; 40,000 kw. hydro-electric plant at Agra, on the Vadas River; 5,000 kw. hydro-electric plant at Loures, near St. George Springs; 50,000 kw. hydro-electric plant on Ladhon River, near Pidima Bridge; 650 mi. of 150,000 volt transmission circuits; 3,000- 4,000 mi. 15,000 volt primary distribution lines; 10,000 mi. secondary distribution lines; 25 sub-stations, $85,000,000. Walter Burke, c/o owner will direct construction. Installation and operation of project. Rhoson Services, Inc., 2 Rector St., New York, N. Y., U.S.A., will act as general manager for owner. Contractor for thermal plant will be selected in September.

Low Bidders & Contracts Awarded

California—Bureau Reclamation, Dpt. Interior, Box 570, Tracy, Aug. 22, headworks, pilot fish screen structure and 1.58 kilowatt distribution line, Delta-Mendota Canal, Central Valley Proj., Spec. R2-117, from Stelle Inc.-Duncanson Harrelson, $151 San Leandro St., Oakland, $213,765.

Idaho, Arco—U. S. Atomic Energy Comn., Idaho Operations Office, Idaho Falls, oil circuit breakers and spare parts, from General Electric Co., River Rd., Schenectady, N. Y., $132,450.

Missouri—Northeast Missouri Electric Power Co-operative, N. M. Boudreaux,

PROCESS HEAT TRANSFER

1. Here is systematic instruction in the calculations, derivations, and principles of heat transfer using the language and methods of industry. Combines both a thorough theoretical background and modern "know how" . . . a complete manual for solving the problems of thermal design arising in the process industries. Covers counterflow, condensed of mixed vapors, furnace calculations, gases, etc., etc. **By Donald Q. Kern, Polytechnic Institute of Brooklyn. 671 pages. $8.00.**

HANDBOOK OF RIGGING

2. Condensed into this new book are all the tips, methods and techniques essential to more effective rigging practices in industrial and construction operation. Deals with everyday maintenance operations—with the transportation and handling of heavy machinery — with the erection and demolition of smaller size structures. Covers everything from ropes, holding chains and hooks, to slings and ladders. **By W. E. Rossnagel, Safety Eng'r. 321 pages. $4.75.**

THE LINEMAN'S HANDBOOK

3. That transmission line fact you want is in this handy guide giving principles, data, methods and cautions on all aspects of the lineman's work. Describes all the materials of line construction: poles, conductors, hardware, tools, electrical apparatus, etc. Information on construction, testing and maintenance shows how to meet problems with right choice of materials and methods. **By E. Kurtz, U. of Iowa. 2nd Edit., 652 pages. $5.00.**

ELECTRICAL ESTIMATING

4. In this manual is all the information you need to estimate the cost of any electrical construction job . . . quickly and accurately. Covers everything from the selection and training of estimators, and the proper use of estimating tools . . . to the cost of preliminary estimates, and the preparation of final bid sheets. Contains scores of sample estimates of actual construction costs. **By R. Ashley, Research Eng'r. 307 pages. $6.50.**

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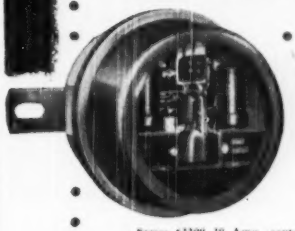

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Approved by street lighting engineers and maintenance men throughout the world, Fisher-Pierce units offer a simplified Photoelectric relay for control of multiple or series street lighting systems. Fisher-Pierce controls give you long tube life (20,000 hours or more), easy servicing, (plug-in chassis construction), *no resetting after power interruptions.* In other words, exceptionally *low maintenance costs.*

Series 61300 5 Amp. Contacts

Models available for direct-connected lamp loads up to 3000 watts, for pilot-wire relay systems, and oil-switch controls for series systems.

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gen. mgr., Palmyra, electrical work for south River Steam Plant, Sec. 8, to Boese-Hillburn Electric Co., 123 W. 8 St., Kansas City, Mo., $169,474. Bids 8/15.

Montana—Bonneville Power Admin., 827 N. E. Oregon, Portland, Ore., 76.9 mi., 230 kv transmission line clearing right of way for Schedules 2, 3 and 4 of Clark Fork section of Spokane Hot Springs, to W. D. Zavalas, Oroville, Calif. $272,925. Bids 8/23. Awarded 8/23.

New Mexico-Arizona—El Paso Natural Gas Co., Bassett Tower, El Paso, Tex., 109 mi. natural gas feeder lines. Approx. $750,000; 451 mi. 24 in. welded joint natural gas pipe line carrier between Farmington, N. M. and Topock, Ariz. Approx. $39,000,000. Own forces.

N. Y., Long Island City—Bd. Transportation, 250 Hudson St., New York, N. Y., 60th St. Tunnel connection to IND Div., Rt. 125A, Sec. 1 and 2, to Arthur A. Johnson Co. and Mason & Hangar Co., 347 Madison Ave., New York, Zone 17. $17,236,000. Bids 8/18.

O., Bellefontaine—U. S. Eng., 836 W. Broadway, Louisville, Ky., radar intercept-or station near here, incl. construction of 10 buildings incl. 3 barracks and homes for officers to George S. Sheaf Co., 449 Neilson St., Columbus, $700,000.

O., Cleveland—City, City Hall, municipal power plant to Hunkin-Conkey Const. Co., 1740 E. 12 St., $1,927,038. Bids 8/11.

INDUSTRIAL, COMMERCIAL & PUBLIC BUILDINGS

Proposed Construction

Calif., San Francisco—Sears, Roebuck & Co., Mission and Army Sts., San Francisco, 3-story, rein.-con. department store with parking area on roof, $3,000,000. W. D. Peugh, 333 Montgomery St., archt., and F. W. Kelberg, 326 Market St., engr.

Conn., New London—Dow Chemical Co., Midland, Mich., plastic plant, 10 mi. north of here, $1,000,000.

Mich., Grand Rapids—American Box Board Co., 470 Market Ave., paper factory, $1,000,000.

Mo., St. Louis Co.—McDonell Aircraft Corp., Lambert St. Louis Municipal Airport, Zone 21, brick, rein.-con., steel aircraft plant adn. $2,500,000.

Mo., St. Louis—Olive Realty Co., c/o Herman C. Waldman, St. Louis Fire Door Co., 400 Withers Ave., Zone 7, 14 story, basmt., rein. con. brick, steel, fireproof apartment hotel on site 63x106 ft., 14 and Olive Sts., $1,000,000.

O., Dayton—Herbert Huber, 69 E. Thurston St., shopping center, east side of Far Hills Ave. between Rockhill Ave. and Lincoln Park Blvd. $5,000,000.

Tex., Houston—University of Houston, 3801 St. Bernard St., plans by Alfred C. Finn, Bankers Mortgage Bldg., engineering bldg. $1,000,000.

Tex., Houston—Prudential Insurance Co. of America, Scanlan Bldg., 18 story, bsmt., 150x225 ft., structural steel, masonry 326,000 sq. ft. office. Approx. $8,000,000. Plans deposit $50; 800 auto carport and asphalt-paved parking zone, $250,000. Plans deposit $25. Kenneth Franzheim, 2506 Crawford St., archt., Dale S. Coerver & Assocs., 420 Sul Ross, and Ward Butterick, 2306 Crawford St., struc. engrs.

Tex., San Antonio—San Antonio Produce Terminal Market Corp., Joe J. Barshop, pres., 310 Produce Row, plans by De Haven Pitts, Travis Bldg., wholesale produce market and terminal S. Zarzamora and Laredo Sts., $2,000,000; 50 trucker stalls in area outside terminal bldg. $150,000. W. W. Orrison Engineers, Travis Bldg., consult. engrs.

Wis., Milwaukee—School Sisters of St. Francis, 1501 S. Layton Ave., Zone 15, Alverno College for Women, incl. chapel, administrative offices, classrooms, convent, library, auditorium, gymnasium, residence and service bldgs., $7,000,000. Maguire & Quick, 4908 Delmar Blvd., St. Louis, Mo., archt. and engr.

Low Bidders & Contracts Awarded

Ala., Butler—Choctaw Pulp & Paper Co., c/o Paul D. Hammacher, Butler, paper mill, Naheola, to J. A. Utley Co., 723 New Hampshire R. O. Detroit, Mich., Approx. $10,000,000.

Kan., Turner—Fairbanks Morse & Co., Fairbanks Morse Bldg., 680 S. Michigan Ave., Chicago, Ill., design and constr. scale factory on Hy. 132 east of Turner, to Stone & Webster Engr. Corp., 32 S. Clark St., Chicago, Ill., $5,000,000.

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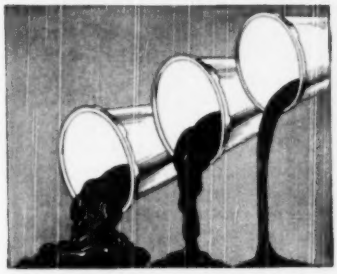

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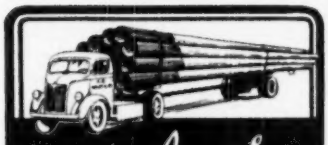

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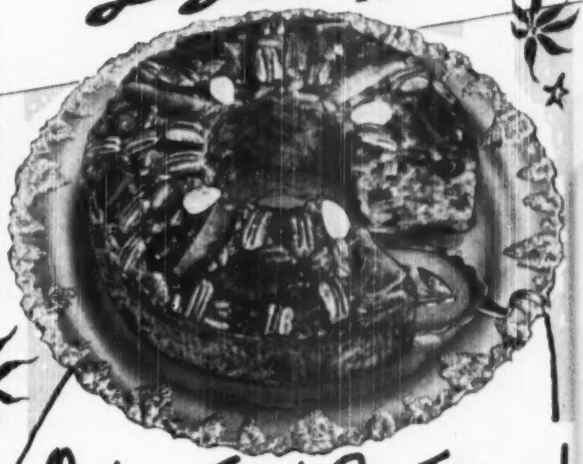

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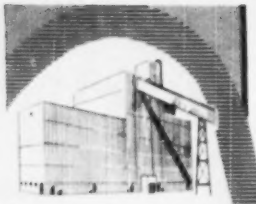
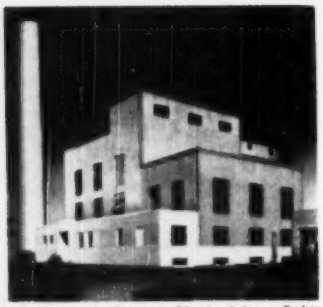
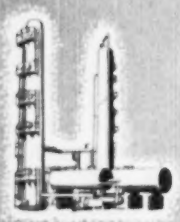


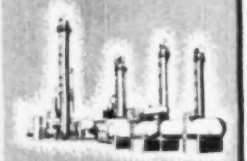
POWER DIVISION



7500 Kilowatt Electric Plant of Iowa Public Service Co. at Eagle Grove, completed fall of 1949



CHEMICAL DIVISION



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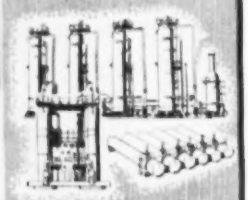

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TECHNICAL LITERATURE

Rural Wiring—*Planned Wiring: The Key to Better Farming* opens with a factual explanation of advantages to be gained in using electricity on farms and in rural homes. It follows through with basic data concerning requirements for adequate wiring and lighting on the farmstead and farm buildings. There are illustrations of overhead and underground wiring installations, together with detailed advantages and planning details for each type of system. Information and wiring layouts appear along with skeletonized views of six service buildings, including a dairy barn and poultry house. The booklet was developed by the Farm Wiring Coordinating Committee. Single copies are 15¢, with reduced rates for larger orders from NEMA Farm Electrification Bureau, 155 E. 44th St, New York 17, N. Y.

Circuit Interruption—Circuit closing and opening operations are presented in concise form in *Fundamentals of AC Circuit Interruption*, by Dr. Erwin Salzer, A-C consulting engineer. This booklet is, in substance, a reprint of a series of articles published in the A-C *Electrical Review* of 1948 and 1949, and written on the level of a college physics text. It emphasizes physics and physical reasoning. Illustrated are air-break, air-blast, and oil circuit breakers. Price of the booklet is 40¢ from Allis-Chalmers Mfg Co, 932 S 70th St, Milwaukee 1, Wis.

Safety Recordings—Number One of a proposed series of twelve 15-min transcribed programs, made exclusively for the use of electric utility safety directors, has been produced. Each of these dramatized accounts is of actual accidents which have happened to employees of large utilities. Scripts were written from the actual accident reports. The program shows the events preceding the actual accident, the accident as it happens, and the result. The moral is pointed out as to how this accident could have been avoided. Further information and prices for this series, "Not by Accident," can be secured from Safety Devices Co, Vendome Bldg, Nashville, Tenn.

Steel Flat Products—A new compilation of ASTM Standards, dated March 1950, includes 39 specifications for steel flat products: plate, sheet, strip, and related materials. The materials covered are widely used for structural purposes, and for boiler and pressure vessels. The 204-page book can be obtained at $2.25 from American Society for Testing Materials, 1916 Race St, Philadelphia 3, Pa.

Arc Welding—*Arc Welding Lessons—For School Shop and Farm* is a 325-page textbook on learning to weld and using arc welding equipment. The book will be available from The James F. Lincoln Arc Welding Foundation, Cleveland 1, Ohio, for $1.

Power Cranes, Excavators—*The Functional Design, Job Applications and Job Analysis of Power Cranes and Shovels* (Tech. Bulletin No. 1) is a complete reproduction of material in the slide film entitled "The Changing World." The first part covers functional designs of power shovels and cranes, and the second part covers job application and analysis. *Operating Cost Guide* (Tech. Bulletin No. 2) is published as a method of estimating cost of ownership and operation of power shovels, hoes, draglines, clamshells, and cranes of ¾ to 2½ cu yd, 2½ to 50 tons. *Proper Sizing of Excavators and Hauling Equipment* (Tech. Bulletin No. 3) is a discussion about selection of proper sized equipment for most economical operation. At each 50¢ each, they may be obtained from Power Crane and Shovel Assoc, 74 Trinity Pl, New York 6, N. Y.

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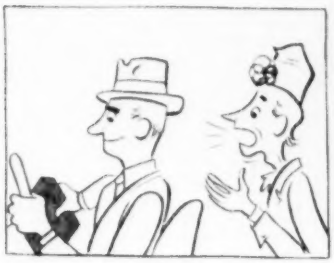

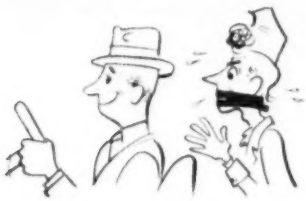

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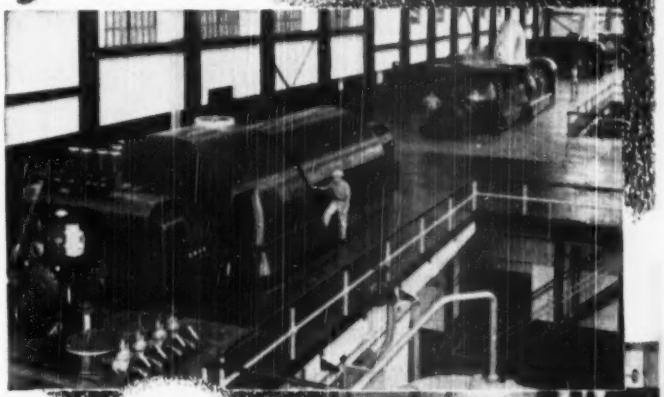

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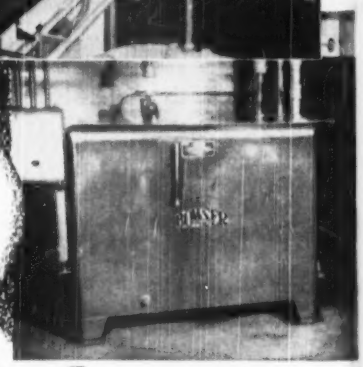

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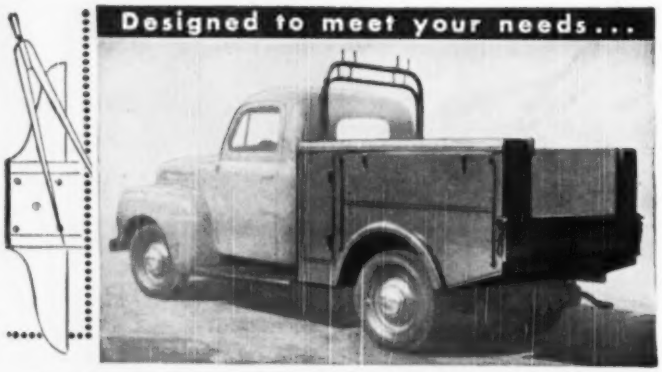

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● BUSES, CONDUCTOR RAIL SUPPORTS: Selecting bus types, features, etc, appear in Publication 5006 covering non-segregated, segregated, and isolated phase metal-enclosed buses for voltages up to 23,000 v, 6,000 amp. Publication 5005 includes listings on supports for overrunning and under-running conductor rails for industrial crane applications for 750-v service. Delta-Star Electric Co, 2400 Fulton St, Chicago 12, Ill.

● RUST PREVENTION: About three dozen different kinds of service and application are included in a new catalog in which there are directions for use of rust preventitives for machinery and implement finishes, heat resistant and chemical-resistant coatings, floor coatings, etc. Rust-Oleum Corp, Evanston, Ill.

● QUALITY: "Quality-Cost" posters for use in manufacturing plants are reproduced in a brochure, "Every Manager's Problem Today." A booklet of general information, "How to Maintain Quality," is included in the "Quality Kit." Elliott Service Co, Dept Q-C10, 30 N. MacQuesten Parkway, Mount Vernon, N. Y.

● LOWERING HANGERS, LIGHTING: Catalog 50 contains general and detailed information, including specifications, on the standard line of disconnecting and lowering lighting fixture hangers, accessories, special devices, and parts. Photographs show installation in industrial plants, railroad yards, and many types of institutional buildings. Thompson Electric Co, 1101-14 Power Ave, Cleveland 14, Ohio.

● PUMP CONTROLS: Autocon Mototrols installed at pump site, and said to automatically operate pumps by means of pressure changes at pre-determined high or low tank levels, are shown in Bulletin 1200. Automatic Control Co, St. Paul 4, Minn..

● SPEED REDUCERS: Information about concentric shaft speed reducers is contained in Bulletin 1105: Selection, hp rating tables, torque capacity tables, order guide, dimensions, etc. The Falk Corp, Milwaukee 8, Wis.

● LUBRICATION: "11 Ways to Cut Production Costs" provides information about methods of saving lubricating oils, and cutting costs in transferring lubricants, standardizing fittings, proper selection, color identification on machinery, etc. Stewart-Warner Corp, 1826 Diversey Parkway, Chicago 14, Ill.

● CONVERTERS: Twenty-two models in five different types of vibrator converters are covered in Catalog 410. These include battery chargers and eliminators, dc to ac and ac to dc converters. There is a selection guide. Cornell-Dubilier Electric Corp, South Plainfield, N. J.

● LIGHTING STANDARDS: In addition to specifications covering the complete line of street lighting equipment and accessories, a new catalog illustrates the gradual transition of lighting standards from 1895 to the present. The Elreco Corp, 2800 Cormany Ave, Cincinnati 25, Ohio.

● WELDING: "Welding Supplies", Bulletin 465, is a guide to the company's electrode holders, clamps and connectors, protective shields, and welding cable. The Lincoln Electric Co, Cleveland 1, Ohio.

● CRANES: Eight-page illustrated Bulletin HL-115 describes design and construction of a new line of auxiliary overhead electric traveling cranes. Brief specifications are supplemented with illustrations of sub-assemblies, close-up views, and installations in various types of service. Northern Engineering Works, 2615 Atwater St, Detroit 7, Mich.

● PHOTOELECTRIC EQUIPMENT: Catalog 550 describes the company's line of photoelectric equipment including accessories for industrial applications, boiler and ventilating smoke detectors, burglar and warning devices, etc. De-Tec-Tronic Laboratories, Inc., Dept. C, 1227 N. Clark St, Chicago 10, Ill.

● METALLIZING: Zinc or aluminum coatings treated to withstand various corrosive conditions are applied directly to the steel base with metallizing equipment used in the Metco System. The systems and their uses and applications are briefly described in Bulletin 93. Metallizing Engineering Co, Inc, 38-14 30th St, Long Island City 1, N. Y.

● TRUCK BODIES: Utility service bodies of many types are illustrated and specifications given, in "Service Truck Bodies." Artisan Products, Inc, 3490 W. 140th St, Cleveland, Ohio.

● INSULATION: Hysol 6888, a new thermosetting plastic which can be used for electrical insulation is described in Bulletin 601. Dielectric strength is 350 v/mil; arc resistance is 135 sec. Houghton Laboratories, Inc, Olean, N. Y.

● DC MOTORS: Design, construction, selection, and ordering information is featured in Bulletin C-2001 for dc motors from ¾ to 1,000 hp. Available are these types: drip-proof, splash-proof, totally-enclosed, explosion-proof, blower-ventilated, and gearmotor construction. Reliance Electric & Engineering Co, 1088 Ivanhoe Rd, Cleveland 10, Ohio.

● WATER CONDITIONER: Publication 4801 describes the company's Hot Process Zeolite Water Conditioner, a two-stage softener in which the first stage is the hot process, followed by the Zeolite softener. Cochrane Corp, 17th St, Philadelphia 32, Pa.

● SAFETY EYEWEAR: A slide-rule like selector gives the safety glass number which the company recommends for 69 different jobs, including electrical workers, linemen, machinists, steam boiler operators, etc. They are described in Catalog A-576. Bausch & Lomb Optical Co, 30 Rockefeller Plaza, N. Y., N. Y.

● INSULATING MATERIAL: "Teflon Tape for Electrical Insulation" presents information about this new plastic which is reportedly of use in motors, generators, and conductors for high-frequency, high-temperature, and high-voltage wires and cables. E. I. Du Pont de Nemours & Co, Inc, Poly-chemicals Dept, Plastics Sales, 9527-D Nemours Bldg, Wilmington 98, Del.

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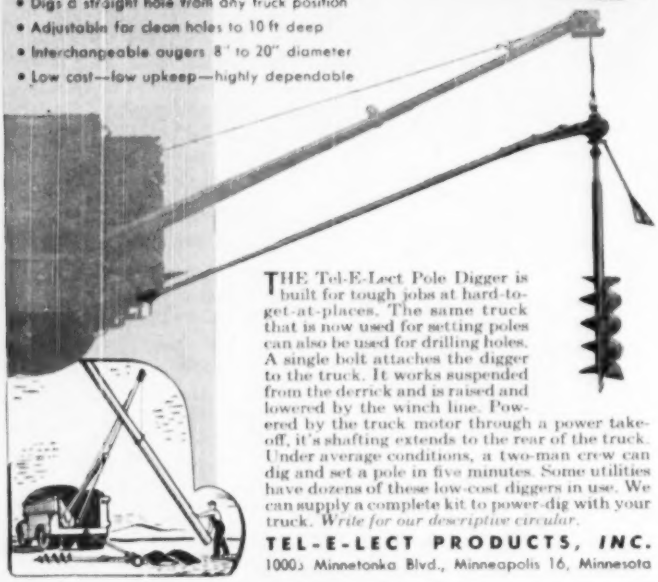

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BOOK REVIEWS

Industrial Instrumentation. By Donald P. Eckman. Published by John Wiley & Sons, Inc, New York 16. 396 pages, illustrated. Price $5.

This volume reviews the principles of measurement methods employed in industrial manufacturing and processing. Important practical details are given with emphasis on the method rather than to the mechanism. One chapter covers emission and absorption spectroscopic analysis, mass spectrographic analysis and other methods. The methods of applying instrumentation to processes are presented with the arrangement and selection of instruments and controllers, process analysis and supervision of instrument equipment. Mechanical measurement instruments such as strain gages, displacement gages, force meters, velocimeters and accelerometers are covered along with high vacuum instrumentation. There are included a large number of schematic diagrams of meter installations and operating principles; also a great many problems. The appendix includes 23 tables. The book is intended for the engineering undergraduate and the problems are mainly elementary.

Electrical Communication. By A. L. Albert. Published by John Wiley & Sons, Inc, New York 16. 593 pages, illustrated. Price $6.50.

This third edition continues to present the fundamentals of telephony, telegraphy, radio, pulsing and carrier. Revision has added much (since 1940) on radio, dial telephony and acoustics. It remains one of the few book sources of information on carrier systems and their dependence on electronics and the technology of telephony.

Report on the Strength of Wrought Steels at Elevated Temperatures. By R. F. Miller and J. J. Heger. Published by American Society for Testing Materials, Philadelphia 3. 109 pages, illustrated. Price $3.

The authors prepared this under the auspices of the ASTM-ASME Joint Committee and it is therefore an authoritative compilation. Embraced are some 28 plain carbon and alloy steels (Cr, Mo, Si) and ferritics and austenitics containing more than 5% Cr. For each is given tensile strength, creep strength and rupture strength. All data is in curve form and mostly to 1400 F.

Mobile Radio Handbook. By Milton B. Sleeper. Published by FM-TV Magazine, Great Barrington, Mass. 184 pages, illustrated. Price $2 (paper), $4 (cloth).

A year ago FCC issued allocations and rules for 2-way radio telephone communication for what have now become 12,000 main stations and over 200,000 mobile units. For all the operators and technicians who install and maintain the equipment there is now this detailed handbook. It gives the rules, application procedure, equipment specifications and frequency assignments. Unusually clear descriptions and discussions follow for the antennas, tower erection, selective calling and relay systems. A particularly specific chapter deals with the methods of maintenance of utility, police and taxicab systems. The closing half of the book gives a comprehensive discussion of FM—the sources of its superiority, the circuits of modulation and transmission, the receiver characteristics and those of automatic frequency control.

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Opportunities are being offered to Engineers and Draftsmen who can design and/or prepare engineering drawings for industrial buildings and their facilities. Assignments are not for specific projects but are in our regular engineering staffs in long-established offices, located on the East Coast, Central West, Gulf Coast, and West Coast. Good working conditions. Established vacation and sick leave plans, also paid holidays.

Positions are open to men possessing a sound background of education and experience qualifying in—

POWER WIRING A.C. AND D.C.—INDUSTRIAL ILLUMINATION
POWER DISTRIBUTION — CONTROLS —
ELECTRONIC APPLICATIONS

Full particulars as to education, experience, and compensation desired should be given in first letter.

NATIONAL HEADQUARTERS
16112 EUCLID AVENUE CLEVELAND 12, OHIO

LIGHTING ENGINEER

Must be a graduate electrical engineer, age 27 to 34, with several years experience in lamps, fixtures or lighting application. Experience in design, sales, writing or speaking also desirable but not essential. This is an interesting position for a young engineer who likes variety and is interested in providing engineering services and sales promotion aid to the sales department. This vacancy is in the Commercial Engineering Department of an established New England electrical manufacturer. State briefly your qualifications, salary requirements and availability.

P-7582, Electrical World
330 W. 42nd St., New York 18, N. Y.

ELECTRICAL ENGINEERS

Graduates, experienced in design engineering and economic studies of steam-electric power plants and high voltage substations. Also, knowledge of power system relaying and preparation of specifications for switchboards and switchgear.

P-7543, Electrical World
330 W. 42nd St., New York 18, N. Y.

EXECUTIVE ENGINEER

Desires connection with progressive organization as general manager, chief engineer, consultant or equivalent position. Graduate and registered professional engineer with graduate studies in management and engineering and 25 years experience in engineering and management of electric utilities and of their regulation. Good personality, married, excellent health, age 50 and U. S. citizen by birth. Salary over $8000, a year secondary to challenging work and opportunity for advancement. Location not controlling but U. S. preferred.

FW-7658, Electrical World
330 W. 42nd St., New York 18, N. Y.

RIGHT OF WAY MEN

for Mid-Atlantic Electric Company. Experience in purchasing transmission rights of way essential. Applicants please give age, education and experience record.

P-7487, Electrical World
330 West 42nd Street
New York 18, N. Y.

NEW "SEARCHLIGHT" ADVERTISEMENTS received by 10:00 A.M. Sept. 15th will appear in the Sept. 25th issue subject to space limitations.

Classified Advertising Division
ELECTRICAL WORLD
330 W. 42nd St., New York 18, N. Y.

720 HP, (500 KW), GE ATI, syn. motor, 2300 v, 2 bearing, delta, 720 RPM, 8 P/F, with direct connect exciter, direct coupled to 600v DC 1 bearing generator. Motor usable as generator and is offered separately. Bargain price.

W. MONTELIUS PRICE CO.
SEATTLE, WASH.

FROM AVAILABLE STOCK

TURBO GENERATORS

Qu	KW	Make	Desc.
2	750	G.E.	Condensing—250 lbs. I.S.P. 440 v. 3 ph. 60 cy.—Built 1944
1	625	Westg.	Non-cond. 125 lbs. I.S.P., 5/20 lbs. B. P.-4 Boy 2 ph. 60 cyc.
1	400	G.E.	Non-condensing 150/175 I.S.P. 5/10 B.P.—480 v. 3 ph. 60 cy.
1	300	Wise.	Non-condensing—125/150 lbs. I.S.P. 5/10 lbs. B.P.—240, 480 v. 3 ph. 60 cy.

SYNCHRONOUS CONDENSERS

	KVA	Make	Type	Volts	Speed
1	3140	Wise.		2400/4150	600
1	4000	G.E.	TSC	2400/4150	900
1	2000	Wise.		2400/4800	720

MOTOR GENERATOR SETS

3 ph. 60 cy.

Qu	KW	Make	Speed	DC Volts	AC Volts
1	1800	G.E.	600	125/250	2300/4150
1	1500	G.E.	360	275	2200/4400
1	1500	G.E.	600	600	2300/4150
1	1250	G.E.	600	275	4150
1	1000	Wise.	900	600	4150
1	1000	G.E.	720	250	2300/13200
1	750	Wise.	900	275	2300/4150

TRANSFORMERS—60 Cycle

	K	Make	Type	Ph.	Voltages
3	2666	Wise.	OISC	1	6900/11000
1	2500	Al. Ch.	OISC	3	13200/2300
1	2000	Pack.	AT	3	13800/2300
3	1250	G.E.	HVDDJ	1	6600/550
3	1000	Pitts.	OISC	1	13200/2300
1	600	Al. Ch.	OISC	3	2300/4150/220-440
3	333	Pitts.	OISC	1	26400/2600

FREQUENCY CHANGERS

	KW	A. C.	25-60 cy. 11000/2300 v

BELYEA COMPANY, INC.
OFFICE & SHOP
51 Howell St., Jersey City 6, N. J.

SUBSTATION EQUIPMENT

TRANSFORMERS

1— 7500 KVA G.E. 138000—4100, 3 ph.
3— 3333 KVA West. 132000—7620/13200 Y
1— 7000 KVA Al. Ch. 66000—2400, 3 ph.
3— 1000 KVA West. 66000—7200
1— 2500 KVA G.E. 59.73 KV, 5 taps, 3 ph.
3— 100 KVA West. 44000—7200/12470 Y
3— 8333 KVA West. 41800—13900
4— 6667 KVA G.E. 38100/66000 Y—12700/22000 Y/13200
2—15000 KVA Al. Ch. 33000—12500, 3 ph.
2— 7500 KVA Al. Ch. 33000—13200, 3 ph.
1— 5000 KVA G.E. 33000—2300/4000, 3 ph.
6— 75 KVA Maloney 33000/16500—2300/6900
4— 450 KVA Al. Ch. 25410/44000—13280/2300
3— 750 KVA West. 13200—440
3— 333 KVA G.E. 13200—2400/4160 Y
3— 167 KVA G.E. 7200/12400—240/480
1— 1500 KVA West. 6900—2300, 3 ph.
1— 1500 KVA West. 4000—2300, 3 ph. Auto
3— 250 KVA Al. Ch. 2300—460

INDUCTION REGULATORS

1—140 KVA G.E. 200 A. 4000 V. 3 ph.
3— 46 KVA West. 200/400 A. 2300 V.
6— 36 KVA G.E. 150 A. 2400 V.
3— 36 KVA G.E. 75/150 A. 4600 V.

CIRCUIT BREAKERS

1—1200 A. 34.5 KV G.E. FKO-339-1000 MVA*
4—2000 A. 15 KV G.E. FKO-339-1000 MVA*
4— 600 A. 15 KV G.E. FMKO-139-750 MVA*
2— 600 A. 15KV West. B-28-B-500 MVA**

* Outdoor ** Indoor

Brew, Woltman & Co., Inc.
52 Church Street New York 7, N. Y.

NEW
7500 KW TURBO-GENERATOR SET

FOR IMMEDIATE DELIVERY

Condensing. High Efficiency, 3 Ph. 50 cy 13800 v, 3000 rpm 600# 825 . Also most of allied equipment and building steel necessary for complete steam plant less boiler and main steam piping

Communicate with J. FORSYTH, *Purchasing Agent*

EBASCO INTERNATIONAL CORPORATION
Two Rector St. New York 6, N. Y.

FOR SALE

WESTINGHOUSE STREET LIGHTING STANDARDS

Riverside type—complete with Egyptian Senior Lighting Units

Located in Indiana

For details address:

AMERICAN GAS & ELECTRIC SERVICE CORP.
30 Church Street New York 8, N. Y.

—TRANSFORMERS—

BOUGHT AND SOLD

We carry a large stock of transformers, and invite your inquiries.

PIONEER TRANSFORMER REBUILDERS

We rewind, repair and redesign all makes and sizes.

One Year Guarantee

THE ELECTRIC SERVICE CO., INC.
"AMERICA'S USED TRANSFORMER CLEARING HOUSE"
SINCE 1912 CINCINNATI 27, OHIO

WATTHOUR METERS

Factory Reconditioned In All Ratings

METERS WANTED

The Electrical Watthour Meter Company
76-15 Woodside Ave.
Elmhurst, L. I., N. Y.
Tel: HAvemeyer 9-0131

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For Cash

YOUR SURPLUS

ELECTRIC MOTORS
MOTOR STARTERS
OIL & AIR CIRCUIT BREAKERS
CABLE WIRING MATERIALS
PANEL BOARD FITTINGS
SPEED REDUCERS
COPPER WIRE

INDUSTRIAL ELECTRIC & SUPPLY CO., INC.
37-1681—Memphis, Tenn.—Box 1398

WANTED
WATTHOUR METERS

Please specify quantities, types, sizes, condition, glass or metal covers, etc.

ATLANTIC ELECTRIC METER CORP.
214 E. 41 St.,
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WANTED TO BUY

Engine Type Generators Only Less Engines — Any Voltage

1—Any Rating 90 to 150 KW, 360 RPM.
1—Any Rating 100 to 200 KW, 300 RPM
Also—1 Only 125 to 150 KW, 900 RPM, Any Voltage.

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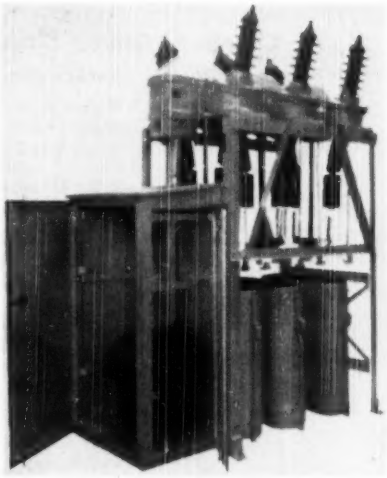
JOSEPH P. MANYPENNY COMPANY

SWITCHGEAR AND SAFETY DEVICE ENGINEERS

212 NORTH 21st ST. PHILADELPHIA 3, PA. TEL. LO. 7-2870



OUTDOOR OIL CIRCUIT BREAKERS ELECTRICALLY OPERATED

Quant.	Make	Type	Volt	Amp.	Int. Cap. KVA
1	G.E.	FHKO-139-60-BF-3	132,000	600	1,500,000
2	G.E.	FKO-136-2046-BS	50,000	400	280,000
2	Condit	FO-40-37C	37,000	400	750,000
1	G.E.	FHKO-136-1334-CS	37,000	400	350,000
1	Westg.	O-221	15,000	600	500,000
3	G.E.	FLO-15-100	15,000	400	100,000
2	G.E.	FKO-136-1328-AS	37,000	400	125,000

OUTDOOR CURRENT TRANSFORMERS IN STOCK

Quant.	Make	Type	Volt	Ratio	Price Each
6	Westg.	O-22	23,000	50-100-5	$190.00
2	G.E.	K-202	25,000	15-30-5	190.00
2	G.E.	KF-310	23,000	300-600-5	250.00
3	Westg.	OA	34,500	15-30-5	210.00
1	G.E.	KF-315	34,500	200-400-5	250.00
1	G.E.	KF-215Y	37,000	15-30-5	210.00
4	Westg.	OB	44,000	15-30-5	265.00
1	G.E.	K-202	45,000	10-20-5	265.00
1	G.E.	K-203	45,000	20-40-5	265.00
1	G.E.	KF	45,000	20-40-5	265.00
2	Westg.	OB	47,000	40-80-5	265.00
1	G.E.	KC-220	50,000	80-160-5	275.00

OUTDOOR POTENTIAL TRANSFORMERS

3 Allis-Chalmers type PW 34,500/115 volts $400.00

NEUTRAL GROUNDING IMPEDOR

For Sale

1—G.E. Co. Neutral Grounding Impedor, or ground fault neutralizer, type Y-3240A, 50/60 cycle, for use in neutral of 230,000 volt circuit, Serial #5693150.

This unit is provided with a transfer switch for changing connections for either 50 or 60 cycle operation and a tap changing switch to permit varying the resistance. Both of these switches are operated manually by handles mounted on the outside of the tank.

Our price on this unit is $15,000 f.o.b. cars, Los Angeles, California.

We will be glad to furnish more detailed information, drawings, photographs, etc.

This equipment is offered subject to prior sale or disposition. *Address:*

SOUTHERN CALIFORNIA EDISON COMPANY

Material and Equipment Sales Department

Post Office Box 429, Alhambra, Calif.

DIESEL POWER

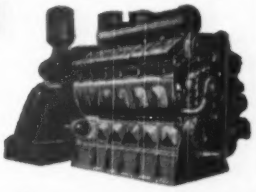
FOR

IMMEDIATE SHIPMENT

UNIT CAPACITIES—10 TO 1875 KVA

A.C.—50 AND 60 CYCLES

VARIOUS VOLTAGES



A PARTIAL LISTING OF OUR INVENTORY

KVA	Make	Model	HP	RPM	KVA	Make	Model	HP	RPM
1875	Fairbanks Morse	32F18	2000	300	375	Enterprise	12SG-6	450	600
1420	Fairbanks Morse	38D8¼	1600	720	330	Superior	KNA	390	514
1250	General Motors	16-278A	1600	720	312	General Motors	8-268A	450	1200
937.5	General Motors	12-567	1060	720	312	Clark	MD-4	375	427
625	Alco	6-12¼x13T	750	600	187	Ingersoll Rand	8	225	514
425	Baldwin	VO-6	510	450	125	General Motors	3-268A	150	1200
400	Buckeye	80	480	600	75	General Motors	6046C	90	1200

D.C. UNITS ALSO AVAILABLE

A. G. SCHOONMAKER COMPANY, INC.

ENGINE DIVISION, 50 CHURCH ST., NEW YORK 7, N. Y.

J. L. HEMPHILL & CO.

ELECTRICAL ENGINEERS & EQUIPMENT

1606 53rd St. NORTH BERGEN, N. J. N.Y.C. Tel. LOngacre 5-3771 N. J. Tel. UNion 2-7600

SLIP RING MOTORS

1—2500 HP G.E. MT 257 RPM 6900V
1— 500 HP G.E. MT 720 RPM 2200 V 4150

SYNCHRONOUS CONDENSER

1—2500 KVA Whse 720 RPM 2200 V with D.C. Exc.

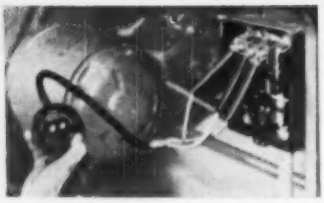
MOTOR GENERATORS

1—1000 KW G.E. 600 V 514 RPM 2200/4000 V
1— 500 KW G.E. 275 V 900 RPM 4150 Volt
2— 150 KW G.E. 125/250 V 1200 RPM 4150 Volt
1— 100 KW El. Mach. 1200 RPM 125/4150 Syn.

TRANSFORMERS

1—6000 KVA Amer. 3 Ph. 27,000V, 2300V.
2—4500 KVA G.E. 3 Ph. 27,000V, 2400V.
1—1500 KVA G.E. 3 Ph. 4150 V 2300 Pyranol
1—1000 KVA G.E. 3 Ph. 4150 V 2400 V
1—1000 G.E. 3 Ph. 4150 2 Ph. 2400 V
1— 500 KVA Kuhlman 1 Ph. 4150 V, 2300 V
3— 400 KVA G.E. 6900 2300 V Sec.
3— 100 KVA G.E. 4150-240/480 V Pyranol
3— 75 KVA G.E. 2400-240/480 V
3— 75 KVA Whse 2300-230/115

Complete Line of A.C. and D.C. Motors and Generators



Save Man-hours,

Have Correct 3-Phase Connections

The KNOPP Phase Sequence Indicator

NOW 60 to 600 v., Higher Frequencies, No Adjustments for Readings

You clip on fully-insulated leads, push safety button and disc rotation shows sequence: A-B-C- or C-B-A. No lamps.

Gives correct indication of voltage or circuit conditions without changing taps or dials. Protects equipment, assures properly connected polyphase wiring. The improved Model K-3 is for all voltages between 60 and 600, 3 phase, 3 wire, 25-60 cycles. May be used on frequencies up to 400 cycles on the higher voltages.

The improved Knopp Phase Sequence Indicator is compact, small, weighs but 21 oz. Laminated bakelite housing, no exposed metal parts. Reliable, durable, accurate, safe. Price $29.25. Leather carrying case, $5.85 additional. Order Model K-3 today or write for fully illustrated factual descriptions.

ELECTRICAL FACILITIES INC.
4236 Holden Street Oakland 8, Calif.

LITTLEFORD

PORTABLE "HanDeeBox"

The All Steel Tool Box

Here's the Fireproof, Thiefproof and Weatherproof tool box engineered to cut labor cost. Valuable tools can be transported to the job and they can stay there overnight without fear of thievery. This "HanDeeBox" is all welded construction with overall locking covers, inside locking arrangement for wheels, partitions for tools, men's clothing, blueprints and first aid equipment. These tool boxes have working space on the outside too. For a long lasting, safe, low cost portable tool box, the "HanDeeBox" has no equal.

LB LITTLEFORD

LITTLEFORD BROS. INC.
421 E. Pearl Street, Cincinnati 2, Ohio

LETTERS TO THE EDITOR

"Industrial Briefs" Popular

To the Editor of ELECTRICAL WORLD:

. . . We find "Industrial Briefs" of considerable interest to our own industrial customers and have been using the "Briefs" since the first issue.

I feel that you should be congratulated on the type of industrial promotional material which you have devised for use in this very important field. We certainly look forward to using the "Industrial Briefs" to advantage in this territory.

W. A. F. Pyle
Industrial Sales Manager
Delaware Power & Light Company
Wilmington, Delaware

(Editors Note: Besides Mr Pyle's company there are 20 other utilities that are regularly mailing some 8,000 reprints of ELECTRICAL WORLD's "Industrial Briefs" to its customers.)

BPA Created In 1937

To the Editor of ELECTRICAL WORLD:

Your August 14th issue contains two errors, one factual and one implied.

The Bonneville Power Administration was created late in 1937 not in 1935.

You imply that BPA is responsible for creation of PUD's. The people of Washington adopted the PUD law in 1930 and the voters of each county created their PUD's with few exceptions at the 1936 and 1938 elections. No new PUD was created in Washington since 1940. The peak of the PUD movement thus came before the Bonneville Project, October of 1937.

Gus Norwood
Executive Secretary
Northwest Public Power Assoc, Inc
Vancouver, Washington

IRE Should Be The Sixth

To the Editor of ELECTRICAL WORLD:

In one of the paragraphs on the page called the "Electrical Week" on page 61 of the July 3rd issue of ELECTRICAL WORLD, an unusual statement was made. The second item reads as follows:

". . . the Engineers Joint Council, made up of the nation's five leading engineering societies, has . . ."

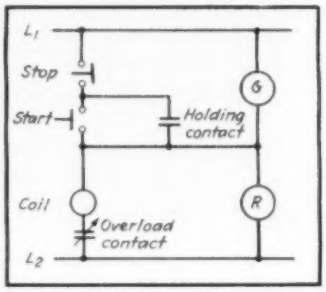
While it is probable that most, if not all, of the societies in the Engineers Joint Council can be classified as *among* the "leading," I am wondering why the statement was made that they are ". . . the nation's five leading engineering societies, . . ."

Harry F. Dart
Past Chairman N. Y. Section IRE

Change In Control Circuit

To the Editor of ELECTRICAL WORLD:

In ELECTRICAL WORLD of August 14, pg 110, appears an article by Frank E. Reeves entitled "Simple Wiring Scheme Reduces Starter Costs." . . . in the stop circuit shown on page 112 the holding contact by-passes both "start" and



"stop" buttons and renders the "stop" button inoperative. Shouldn't the connections be as shown in the accompanying sketch?

Roger B. Wilcox
1308 Manchester Road
Wheaton, Ill

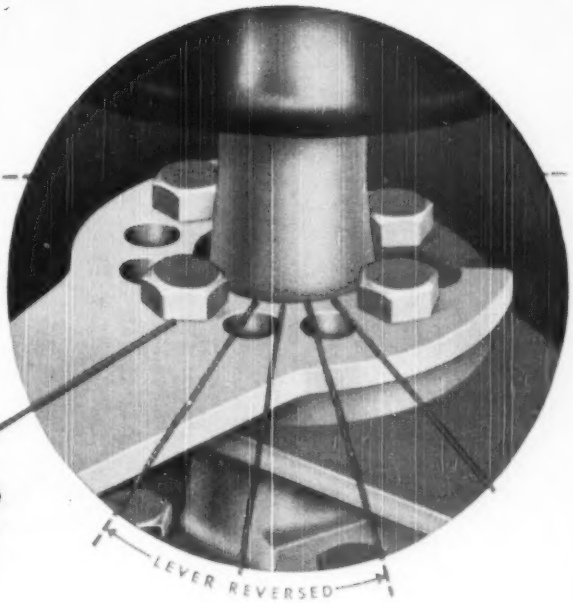
Reader Wilcox is absolutely correct in that the "stop" button is incorrectly wired as shown in the article. The holding contact should, of course, be connected in parallel with the "start" push button. The main purpose of the article, which was to save a normally-closed auxiliary contact for green light indication, is unaffected by the error, however . . .

Another reader points out that the circuit lends itself nicely to accurate trouble analysis. When the "red" and "green" lights each show half brilliancy, an open in the coil is indicated. This may be due either to a burned-out coil or to an operation of the overload device. This condition can be verified by pressing the "start" button which will cause the "green" light to go on and the "red" light to show full brilliancy; but the motor will, of course, not start.

Frank E. Reeves
Power Plant Design Engineer
Barnard & Burk
Baton Rouge, La.

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



Asymmetric drilling of 30° mounting holes in the new Universal Mounting Lever enables it to be set at 15° intervals—within 7½° of the desired angle.

15° ANGLES make switch mechanisms universal

Now you can order your disconnecting switches complete with operating mechanisms at the time your structure is planned. No need to wait for final details to be worked out. Just order Westinghouse Type V Switches with the Universal Mechanism—and you can be sure they'll meet any but the most unusual arrangements. That's because the new operating lever can be set within 7½° of any desired angle to provide easy operation.

Here is another place where attention to little things makes the Westinghouse Type V Disconnecting Switch the biggest dollar value on the market today. Get the benefits of experience and top-grade switch design in your system. Install the Westinghouse Type V.

For complete information on the Type V, or on the entire Westinghouse switch family, get in touch with your nearby Westinghouse office or distributor. Ask for B-4241 and B-4242. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

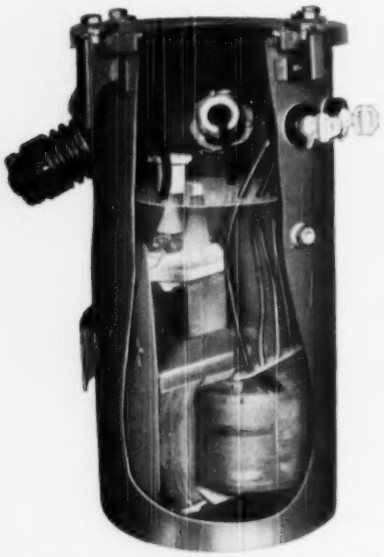
J-60701

Westinghouse

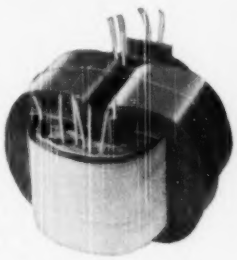
TYPE V

DISCONNECTING SWITCHES

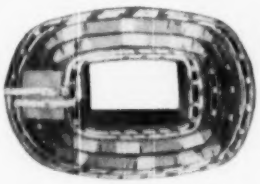
How KUHLMAN builds for lasting service



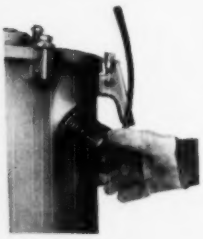
The cutaway above gives graphic proof of the sound, carefully engineered construction of Kuhlman Distribution Transformers. These transformers have been proved "under fire" for over half a century, yet we take nothing for granted — Kuhlman is continually in search of new materials, new methods, new designs, which will mean even greater efficiency, safety and economy for you. A few of the many outstanding features of the Kuhlman Distribution Transformer are pictured and described below.



The heart of every Kuhlman Transformer 25 KVA and below, is the famous Kuhlman Bent Iron Core made of cold rolled, oriented silicon steel. It permits the flux path to follow the grain of the steel, resulting in higher permeability, lower hysteresis and saving 25% in weight over cores using hot rolled steel. Core and copper losses are reduced, and exciting current is reduced as much as 75% by utilizing lapped joint construction. In short, the Kuhlman Bent Iron Core is more efficient, smaller, lighter, easier to handle — and *only* Kuhlman has it!



Wide oil ducts. Ample oil circulation is assured by wide oil ducts throughout the windings. The oil itself has been refined to a degree which assures full stability. Transformers are filled with oil under vacuum so that no air is trapped inside. Completely protected coils are dried and coated with high grade phenolic base polymerizing type varnish which bonds the coil into a compact structure.



"Quick-grip" pocket bushings. Pocket type high voltage bushings can be connected as easily as your garden hose. All metallic parts are entirely surrounded by porcelain and by turning the knob at the end, the clamping mechanism opens or closes like a valve, freeing or securing the line connection. No tools necessary!

Write for this new bulletin CS-201 which gives complete facts including specifications on Kuhlman Distribution Transformers, Conventional Type 100 KVA and below. Kuhlman also manufactures a complete line of Power, Dry Type, Street Lighting, and Specialty Transformers. Bulletins available on request.

Sturdy, long-life tanks. All Kuhlman Distribution transformers have sealed tanks fabricated of heavy gauge copper bearing steel and are thoroughly tested for leaks after fabrication. Three coats of paint are put on over a shot blasted surface; one coat of rust inhibitive primer, and two coats of corrosion resistant paint. Tank surfaces have withstood 500 hours of salt spray and weatherometer tests.

EXPERIENCE COUNTS — THIS IS OUR 56TH YEAR

Kuhlman

KUHLMAN ELECTRIC COMPANY
BAY CITY, MICHIGAN

Export Representatives: *International Standard Electric Corporation*, **67 Broad St., New York City, N.Y. Cable Address: Microphone, N.Y.**